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ORNITHOLOGY.



Little Nectarine Sunbird.

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VOL. V.

ORNITHOLOGY.

SUN-BIRDS.

BY THE EDITOR.

EDINBURGH:

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In all Thirty-two Plates in this Volume.

MEMOIR

OF

FRANCIS WILLUGHBY.

MEMOIR

OF

FRANCIS WILLUGHBY, ESQ. F.R.S.

To Francis Willughby, Esq. or Willoughby, as it is now commonly written, an English gentleman, who died A. D. 1672, in the thirty-seventh year of his age, is ascribed, by eminent authorities, the honour of having greatly contributed to advance the science of Natural History,* and of having

* "Francis Willughby was the first naturalist who treated the study of birds as a science, and the first who made any thing like a rational classification."—*Neville Wood's Ornithologists' Text-book.* "Willughby was the most accomplished zoologist of this or any other country, for all the honour that has been given to Ray, so far as concerns systematic zoology, belongs exclusively to him. In botany, and in no other science, was Ray the author of a system, for he confessedly adopted Willughby's both in ornithology and ichthyology, while his arrangement of quadrupeds, and of insects, was doubtless derived from the same source."—*Swainson, in the Cabinet Cyclopædia.*

laid the foundation for the improvements made in some of its departments by subsequent writers.* In order to the due appreciation of his ingenuity and labour, it may be requisite to commence this memoir of him, with a sketch of the origin and nature of Zoology; and of the state in which it existed at the time when he commenced his researches.

It may be inferred that mankind would, from the earliest period, be led to make observations on the inferior animals. Some degree of such knowledge would often be essential to their own safety and welfare. This would also be the case with the more intelligent and pious portion of them, from higher motives, since it is the characteristic of such persons in all ages, that "they regard the works of the Lord, and consider the operation of His hands."† The naming of the animals by Adam, recorded in the second chapter of Genesis, implies some examination, or at least some notice having been taken of their most obvious distinctions,—a supposition which will be accepted by those who consider, that the Hebrew language, in the state of it in which we now possess the writings of Moses, was the original language of mankind, or nearly so; because the names he gives to the animals are apparently

* "He alone is the author of that system, which both Ray and Linnæus took for their guide, which was not improved by the former, nor confessed by the latter." —*Swainson.*

† Isaiah, v. 12.

formed by onomatopæia,* or in imitation of their natural cries and notes.† Thus, the name given to the tamer animals, sheep or kine, was *beme;* in which sound, the lowing of the one, and the bleating of the other, seem to be imitated: so the name of the common ass, *orud*, and of the wild ass, *pra*, resembles their braying. The name of the raven, *oreb*, was doubtless taken from its hoarse croaking; of the sparrow, *tsippor*, from its chirping; of the partridge, *quera*, from the note she uses in calling her young; and the murmur of the turtle-dove is exactly expressed by its Hebrew name, *tur*, and evidently gave rise to it. Other names seem taken from the distinctive qualities of animals; as, for instance, the camel might be called *gamel*, from its revengeful temper; and the sheep, *rachel*, from its meekness; the ram *agil*, because agile and active. The ingenious editor of Calmet, criticising on the name of the stork, *chasidah*, which means mercy or piety, supposes it to be derived from the peculiar care taken by that bird of its aged parents; and says, "I take this opportunity of remarking, that the external actions of any creature are most likely to give it an appellation before its disposition; and that, did we know intimately the actions, appearances, and manners

* "The surest etymologies are those derived from the onomatopæia."—*Rees's Cyclopædia.*

† For some of the following observations relating to the subject, the writer is indebted to Dr Harris's Natural History of the Bible.

of creatures, we should no doubt find in their names, when primitive and original, very descriptive and apt epithets."

In the account of the creation by Moses, there is an orderly arrangement of the objects of Natural History, perfectly simple, yet strikingly systematic, rising from inert matter, through vegetation and animal life, up to intellectual being; of these severally, it is said, that they were each made "after its own kind" or species.

It may be permitted here to insert the zoological classification of the ancient Jews, in a systematic form, taken from the interesting work to which obligations have been already acknowledged.

The system of Moses, derived from the first chapter of Genesis, verses 20, 21, 24, 25, &c. It is disposed in triads. 1. Earth; 2. Air; 3. Water.

1. Earth.

1. *Desha*, translated "grass," including small herbs of every order.
2. *Osheb*, "the herb yielding seed," including all larger plants, whose seeds are conspicuous, rising higher than the grass, having stalks, not ligneous, of annual growth.
3. *Otz*, or tree, including shrubs and large trees of every description and species; Perennials, "fruit bearing, whose seed is in them," that is, in the fruit, whether the fruit or nut be proper for the use of animals or not.

2. Water.

Including all creatures supposed to have originated in the water, residing on it, or frequenting it occasionally.

1. *Sheretz*, animalculæ, translated "the moving creatures that hath life." By this word, is meant all sorts of creatures which creep in the *water*, in opposition to those which creep on the earth, called *ground reptiles*, verse 25; every animal capable of motion, which either has no feet, or feet so short that it rather creeps than walks. It includes all aquatic creeping things, as worms, polypi, lobsters, crabs, shrimps.
2. *Tannim*, a word erroneously translated "great whales," whereas it is properly the generic name for all the *large aquatic animals*.
3. *Ouph*, translated "fowl," but the word really includes every creature which lifts itself above the earth on wings, whether birds or insects, exactly corresponding to the Saxon word, *fleon*.

3. Earth.

1. *Behemah*, translated "beast of the earth," including all animals capable of domestication, and feeding on vegetables.
2. *Chiah*, translated "beast of the field," including wild beasts living on flesh.

3. *Remes*, translated "creeping thing, including all sorts of less animals creeping on the ground, vermin, all the different genera of worms, serpents, and such creatures as have no feet, or numerous small feet, comprehending not only all the serpentine class, but all the smaller sort of animals that seem to creep rather than to walk.

4. ADAM, INTELLECTUAL BEING.

This classification, and the terms of it, are used with the strictest regularity by Moses, not only throughout the book Genesis, but also all his other writings.

In the eleventh chapter of Leviticus, the same distribution of the animal kingdom is adopted, but subdivided still farther into the denominations "clean" and "unclean," or those creatures allowed for food or prohibited, a distinction which, from the words of Moses, would seem to have been known in the time of Noah.*

* Genesis, vii. chapter. "Of every clean beast thou shalt take to thee by sevens, the male and his female, and of beasts that are not clean, by two, the male and his female," &c. Some persons, however, might think with Spencer, *De legibus Hebræorum*, lib. 1. c. v. that Moses, who wrote the book Genesis, while conducting the Israelites through the wilderness, and after the delivery of the law, and when, consequently, they were acquainted with the distinctions of clean and unclean animals, uses the words in this passage, as they also suppose he speaks of the Sabbath in the second chapter,—namely, by *antici-*

This farther distribution is divided into beasts, birds, and fishes, and is founded, with regard to *quadrupeds*, partly on *the external, and correspondent internal structure of the feet, and partly also on the habit of rumination.*

The system may be thus stated.

Unclean.

I. QUADRUPEDS.

Solipedes.

All quadrupeds having but one hoof, as the horse and ass; or having the hoof not *entirely*, but only *partially* divided into *two* parts, as the camel; or having the hoof, though entirely divided, yet into *more* than *two* parts; or having the hoof entirely divided externally, yet not having, besides this external structure, its internal anatomical constitution strictly correspondent to this formation, as the swine, (for though the outward appearance of the hog's feet be like that of a cloven-footed animal, yet, internally, they

pation, and so would understand by the direction recorded to have been given to Noah, merely that he should take a larger number of the more useful animals than of those not so useful. Others, perhaps with more propriety, regard the terms as one among many of those references to a patriarchal church, which they think they discern in the brief, abrupt, and very condensed history of the old world.

have the same number of bones and joints as animals which have fingers and toes, so that the arrangement of its feet bones is into first, second, and third *phalanges* or knuckles, no less than those of the human hand;) and animals having the requisite external structure, and correspondent internal formation, yet not *ruminating;* or though ruminating, not having the requisite construction of the feet, as the *saphan,** translated coney, Lev. x. 5, Deut. xiv. 7; which, though it ruminates, yet has its feet divided by two clefts into *three* toes. These are the "legislative naturalist's" most obvious distinctions of unclean quadrupeds.

The Clean.

Fissipedes.

All quadrupeds having their hoof *entirely* divided into *two* parts *only*, and having a corresponding internal construction, and *ruminating*, as oxen, deer, sheep, and goats.

II. FISHES.

The Clean.

All such as have fins and scales.

* "Probably the different species of jerboa, *mus jaculus*, Linn. are included in this word. The Rabbins render it the rabbit."—*Gesenius's Hebrew Lexicon.*

The Unclean.

All such as are defective in one or both of these requirements.

III. Birds.

These are subdivided into, 1. Land birds; 2. Those of the air; 3. Those of the water, not web-footed; and these last are again farther divided into, (1.) Those which prey on living game of all kinds; (2.) Those that feed on dead prey; (3.) Those that feed on fish.

The Clean.

Including all those which subsist on vegetable food.

The Unclean.

Birds of prey generally.

IV. Reptiles.

Unclean.

All creatures that creep, going upon all four; and whatsoever goeth on the belly, or whatsoever hath more than four feet, excepting,

Those winged insects, which, beside *four* walking legs, have also *two* longer springing legs, *pedes saltatorii*; these, under the denomination of locusts, are declared to be clean.

The same system is recognized by Jewish writers, of widely different times.*

Now, though it be demurred, that this system was derived from inspired direction, and, therefore, ought not to be mentioned in an historical sketch of Natural History, in which regard is supposed to be had only to the results attained by the unassisted faculties of man; and though it be objected, that it owed its origin to the requirements of a ceremonial religion, or to the design of preserving the Jews distinct from every other nation, and especially from the Egyptians, and not impossibly, also, of serving, at the same time, the farther purpose, not unworthy of divine care, of a guide in the choice of viands most favourable to health and virtue; yet it must be confessed worthy of more notice than has sometimes been paid to it, both as truly meriting the name of a system, and as unquestionably being the most ancient specimen of the kind now known to be extant.

Respecting one part of it, Michaelis, in his Commentary on the Laws of Moses, observes,† "That in so early an age of the world we should find a systematic division of *quadrupeds* so excellent as never yet, after all the improvements in Natural History, to have become obsolete, but, on the contrary, to be still considered as

* Genesis, vi. vii. viii. ix.; Kings, iv. 33.; Psalm cxlviii.; Acts, x. 12.

† Article CCIV.

useful by the greatest masters of the science, cannot but be looked upon as truly wonderful."

In the history of Solomon, who flourished about a thousand years before Christ, we meet with the next most ancient recognition of the study of Natural History. In the account given of that monarch's attainments, in the first Book of Kings, 4th chapter and 33d verse, it is stated, that "he spake of trees, from the cedar that is on Lebanon, even unto the hyssop, (or moss,* rather, the first trace of vegetable germination,) that springeth out of the wall; he spake also of beasts, and of fowl, and of creeping things, and of fishes;"—in which account it is worthy of remark, that, with the addition of trees, the same distribution is adopted, and in the same order as that which occurs in the words stated to have been spoken of God to Noah thirteen centuries before.

Though it is impossible to say, amid the absence of all means of judging, except isolated assertions like these, what were the real attainments of Solomon in Natural History; it will not be thought a hazardous conjecture, that they, at least, included a correct acquaintance with that system, as far as it extends, which is involved in the Levitical ritual. How far his mind, highly gifted by nature, and endowed with superhuman sagacity, might have rendered that system the nucleus of more extended inquiries, aided as he

* Hasselquist.

was by importations from India,* and possessed of the greatest pecuniary resources, may be a matter of supposition, but cannot now be ascertained; as also the influence of his example, in regard to such pursuits, upon his many learned and pious cotemporaries and successors.

The first individual who can positively be proved to have pursued the study of Natural History as *a science*, is the immortal Aristotle. Previously, however, to taking that degree of notice of his researches which is required by the object of the ensuing sketch, it may not be unacceptable to some readers if it be attempted briefly to state what is to be understood by the *scientific* pursuit of any department of Natural History.

Mankind universally have, no doubt, ever been able to distinguish and to describe with more or less accuracy some or other of the individuals of the animal kingdom; every one who has frequently seen such creatures, knowing the difference between a quadruped and a bird, between a bird and a fish, and between individuals of the same order, as between a dog and a cat, a pigeon and a hawk; and it is probable that even written descriptions and drawings of some animals, having various degrees of truth and similarity, have ex-

* 1 Kings, x. 22. For the king had at sea a navy of Tharshish with the navy of Hiram; once in three years came the navy of Tharshish, bringing gold, and silver, ivory, and apes, and peacocks,—or parrots, as some understand by the word in Hebrew.

isted from a remote period among civilized nations. But, carried to this extent only, Natural History consists in mere amusement, and the books and pictures serving merely this purpose, may afford relaxation from more important studies, or at best supply the naturalist engaged in the formation or study of a system with useful descriptions of such individual creatures as may be inaccessible to his own observation.

Yet, in nearly this state did Natural History continue till the time of Aristotle, at least among such portions of mankind as were unacquainted with the Scriptures, and for many ages after him. The scientific pursuit of any department of Natural History supposes *classification*, or the arrangement of its various objects into those divisions called genera and species, an arrangement founded on some selected points of agreement between those objects.

The most general, because the most obvious point of agreement, would be a complete identity among different individuals. Thus, to take a familiar illustration from ornithology,—a certain bird being called a crow, the same name or noun is given to every other crow in the flock, which general name or noun is technically called the genus. Among the different tribes of creatures, however, the resemblance, though very close, is not complete, the difference sometimes consisting in but few subordinate variations, sometimes only in one; in such cases, the naturalist considers to which *genus* any given instance of variation

bears the greatest resemblance, either naturally, or agreeably to the principles of his system; and having fixed on it, he denominates the variety a *species*. Thus, the hooded crow is a species of crow. So also, having determined which description of the humming bird he will consider generic, he denominates the varieties and deviations from this description within certain limits, as the different species of humming birds. To each of the different species some name is given descriptive of its chief distinctions, and thus, those who agree in the use of the same classification, and of the same names of the different species, can readily enable each other to find in books any particular species.

Thus, genera and species are founded in resemblances; and by assorting animals together, agreeably to any particular resemblances which may be determined on for the purpose, whether toes, teeth, claws, beaks, habitation, food, habits, &c. a *system* is formed, and the particular point of resemblance adopted by any individual naturalist distinguishes his particular system, and in the superior advantages for scientific purposes of any author's classification, consists the superiority of his system.

The most obvious resemblances are not, however, always to be chosen for the purposes of system.

"The rudest wanderer in the fields, "observes an eminent writer,"* may imagine that the pro-

* Dr Brown's Philosophy of the Human Mind.

fusion of blossoms around him, in the greater number of which he is able to discover many striking resemblances, may be reduced into some order of arrangement. But he would be little aware that the principle, according to which they are best classed, has relation not to the parts which appear to him to constitute the whole flower, but to some small part of the blossom, which he does not perceive at the distance at which he passes it, and which scarcely attracts his eye when he plucks it from the stem." This distinction respecting the resemblances, which, though obvious, are not always best adapted for classification, may be thus illustrated: "There is a species of monkey so like a lion, that it may be compared to a monkey in a lion's skin; it has the lion's long mane, slender tufted tail, and the fur in all other parts short and compact. But the resemblance not only extends no farther, but so total a dissimilarity exists in all other respects between these two creatures, that it would be absurd to class them together."

It is the preponderance of similar characteristics which indicates to the naturalist the affinities of animals. From the classifications founded on these, which can only be derived from the most accurate and extensive examination of facts, he proceeds to "detail whatever can make us acquainted with the history of animals, comprehending a knowledge of their varieties, external forms, organs, habits, and to expound the laws by

which their distribution is regulated over the different portions of the globe.*

It is farther to be observed, that a system must either be artificial or natural. The foregoing remarks relate to the formation of an artificial system. It may now be allowed to add a statement of what is to be understood by a *natural* system, or rather *the* natural system; for it is pleaded, that the true system of nature can be but *one*. The natural system is supposed to be that which will consist, when discovered and verified—for it is still a *desideratum*—of a development of the true scale of universal being, or that plan on which every object was created, and upon which animals and plants, by the intervention of an infinity of intermediate forms, blend into each other, and are finally so united as that it cannot be known where to draw the line of demarcation. This natural series of beings is *complex*, forming in its progress certain deviations which resemble a series of circles. A system can only be natural which attempts to explain the analogies or resemblances between the individuals or divisions of one circular series when they are compared with those of another circular series. The relationship between all natural objects is twofold—immediate and remote. The first of these is called an affinity, the second an analogy. Thus there is an affinity between the swallow and the goatsucker. These genera

* Macgillivray.

are intimately connected by structure, habits, and economy: both fly nearly in the same manner, and both live upon insects captured in the same way; but the goatsucker has also the relation of *analogy* to the bats, by flying at the same hour of the day, and by feeding in the same manner. The natural system must state these varied relations and resemblances, and prove that they succeed each other in a uniform progression, because it has been repeatedly demonstrated that the contents of one circular group represent the contents of another circular group. If, however, by the natural system we are to understand a *complete* development of *all* the properties and relations of animated beings, the functions they are intended to perform, the principles upon which their forms have been regulated, their indisputable affinities among themselves, and their innumerable analogies to all others, then the natural system is a pinnacle of knowledge to which finite beings can obviously never reach. The system, therefore, which develops principles of the widest application, and brings the elements, if we may so term them, of natural classification into the narrowest compass, is that which obviously makes the nearest approach to nature, and therefore deserves to be distinguished *par excellence* as the natural system."* Several individuals are named as having proposed the

* Swainson, Preliminary Lecture, and Treatise on the Geography and Classification of Animals.

development of the natural system in the modified sense of the term; but naturalists are still undetermined upon which of their systems the exalted title should be bestowed.

Both artificial and what are considered to be natural systems have their respective advantages and disadvantages. The advantages of a good artificial system, are, that it facilitates research after an unknown object, and thereby renders the study of natural philosophy more inviting to those who propose to make respectable attainments merely in any of its departments.

The disadvantages of an artificial system are, that it disregards the order of nature,* which it is the chief object of Natural History to develop; that, from its nature, it cannot be formed on general principles, in which alone the complex relations of natural objects can be determined; that it involves a multiplication of divisions,

* This disadvantage is thus illustrated by Mr Swainson. Alluding to the best classification of quadrupeds extant, he observes, "Commencing with the oran-otan, the series passes thence to the baboon, the monkeys, the howling apes, the prehensile monkeys, and the bats. So far there is an evident appearance of a natural series, and we begin to think the author is really arranging animals *according to the order of organization;* but when we have arrived at the end of the first fragment of the chain, and dismissing all idea of continuity, we are to begin on another. Immediately after the bats are placed the hedgehogs, and following them come the bears. Every person possessing the slightest knowledge of these animals must perceive how *unnaturally* they are combined."

in order to meet what is called by Cicero "the insatiable variety of nature;" that it can exhibit only disjointed parts of the universal frame of being. On the whole, an artificial system is best adapted for use, while a natural system alone can enable us to know the probable station of any creature in the system of the scale of being, by the affinities it possesses to others, and the analogies by which it is related and represented. The attainment of the best natural system is, however, likely to follow from the inquiries made by the best artificial systems.

The *first* formation of an artificial system, when all circumstances are considered, will ever be regarded as an interesting epoch in the annals of science. It is now intended to contemplate that event as it is presented in the history of Aristotle. Scarcely any thing is known with certainty of the early life of this illustrious man, except that he studied at Athens with the most intense assiduity under Plato, and that this eminent philosopher used to call him "the mind of his school;" and when Aristotle was not there, to say, "The soul of the school is absent."

Some time after the death of Plato, which happened about the year 348 B.C. and when Aristotle was thirty-six years old, he began to teach publicly at Athens; and after having gained the highest celebrity as an instructor of youth, he was invited by Philip, king of Macedon, to undertake the education of his son Alexander then about fifteen years of age. The letter in

which Philip invited him to undertake this office expresses his high opinion of the philosopher's attainments. He declares that he "thanked the gods, not more for having given him a son, than for having bestowed him in the time of Aristotle." Nor less expressive are Alexander's own words of the value he placed in his tutor's instructions, —"I am not less indebted to Aristotle than to my father; since, if it was through the one that I lived, it was through the other that I have learned to live well." During his residence at the court of Macedon, he not only superintended the education of the youthful prince, but most likely, amid many other improvements in science, formed that system of Zoology which has justly obtained for him the titles of "The father of Natural History," and, "The secretary of Nature."

Alexander was called to the throne at the early age of twenty, through the assassination of his father by Pausanias, one of the officers of the guard. Two years afterwards he set out on his Asiatic expedition, and Aristotle returned to Athens; and during the next thirteen years he lectured in the Lyceum, a large enclosure in the suburbs; still, however, continuing to correspond with his former pupil. That celebrated prince had already bestowed on his tutor the magnificent sum of eight hundred talents, to be appropriated to the furtherance of his investigations, and had placed at his disposal many thousands of persons, who were employed by him in collecting animals for his inspection, by hawking, hunting,

and fishing. Alexander also took with him, on his Asiatic expedition, more than a thousand persons for the same purpose. But these unparalleled advantages owed their chief value to the powers of the philosopher's mind, and to the system of inquiry which he applied to the animal kingdom,—a system employed, but not improved, by Bacon and Newton in their several researches.

He possessed also that other rare, but indispensable qualification,—a mind totally devoid of prejudice. He utterly discarded every tradition of his countrymen respecting any animal, however venerable that animal had become by the connection with it of their religious belief. Actuated by the same perfect love of truth, he adopted the most literal description of facts, instead of the rhetorical style employed by other teachers of philosophy, not excepting his own venerated instructor. According to some writers, he must have composed more than four hundred treatises, of which no more than forty-eight are extant, and not one of these in a perfect state.

His history of animals, four volumes octavo, which it is most congruous to the object of this sketch to notice, is, in the judgment of an eminent naturalist, "composed in a method so luminous, as not yet to have been equalled by any subsequent writer." The principal divisions which are still adopted by naturalists in the animal kingdom are those of Aristotle; and he proposed some, which have been resumed after

having been unjustly rejected."* His great principle, and from which he never deviates, is the observation of facts; comparing them, and endeavouring to discover the circumstances in which they agree to the greatest extent.

He begins by laying down a great number of general propositions, or aphorisms, which must evidently have been derived from the careful observation of an immense number of phenomena. The following may be regarded as specimens taken from his first book on the description of the parts of animals:—

"Some parts are simple, and divided into similar particles; while others are compound, and consist of dissimilar elements.

"The same parts in animals vary in form, proportion, and other qualities; and there are many creatures which, although they have the same parts, have them in different situations. Animals differ in their mode of living, actions, and manners: thus, some reside on land, others in water; and of the latter some breathe water and others air.

"Those parts which seize the food, and into which it is received, are found in all animals. The sense of touch is common to all," &c.

The following is the zoological system of Aristotle:—

Red-blooded animals.

Quadrupeds, serpents, birds, fishes, cetacea

* Macgillivray's lives of eminent zoologists

White-blooded animals.

Testacea, crustacea, mollusca, insects.

Under these genera he arranges in subdivisions the various species of animals which he had observed.

The system is not considered as in any respect perfect, much less as sufficient to supersede some modern systems. It is chiefly remarkable as being the *first* recorded attempt at *system* among the Gentiles; and thus, its merit would seem to consist in its *originality*, unless we take heed to the affirmation of some ancient Jews, that Aristotle had derived his knowledge of Natural History from Solomon, having seen some of that monarch's treatises, and which some Jewish writers of antiquity maintained to be extant in their time under an Arabic translation.*

Could it be shewn that the system ascribed to Aristotle was *suggested* by his acquaintance with any prior zoological arrangement, then *his* merit would consist in the *discernment* which led him either to *select* the arrangement itself, or in his sagacity to improve on it; if it was *original*, its praise can only be duly awarded by those who consider the immense difference which exists between individual discovery and the capacity of apprehending, and of improving upon, the

* Ce qui me parôit très sur, c'est que ce livre existe; il doit contenir un ample commentaire sur les plantes et les animaux de l'Ecriture, et toute la doctrine de la philosophie orientale.—SCHEUCHZER.

discovery of others. "It is, perhaps, impossible, at the present day, when the investigation of nature is so much facilitated, by the accumulation of the knowledge of ages in every department of physical science—by the commercial relations existing in all parts of the globe—by a tried method of observation, experiment, and induction—and, finally, by the possession of the most ingenious instruments,—to form any adequate idea of the numerous difficulties under which this ancient naturalist laboured."* It is remarkable, that as it is not known that Aristotle had any companion in the scientific pursuit of zoology, so there is no record of any follower, at however great a distance, till Pliny the elder, born in the reign of Tiberius, in the twentieth year of the Christian era, that is, nearly three centuries and a half after the death of Aristotle.

It appears that Pliny travelled into Germany, Spain, Africa, and perhaps Britain, Egypt, and India; that he was engaged in political and military services, and yet, at the same time, that he devoted himself so sedulously to literature, as that scarcely any one before him had written so many books.

He compiled thirty-six volumes of natural history, chiefly from the works of other writers, amounting, as he asserts, to 2000 volumes. The very names even of many of these authors would now be unknown but for Pliny's own enumeration

* Macgillivray.

of them. In vain, however, do we look into his works for any of the excellencies of Aristotle. Amid the enormous multitude of facts which he has recorded, he could scarcely have avoided the statement of some truths: but compilation was evidently his great object, and the choice of the strange and marvellous his ruling passion. It is an open question, how far his sentiments respecting *religion* may have influenced the composition of his works on natural history; but those works themselves exhibit an utter absence of discrimination, guided either by an acquaintance with the system of nature, or regard to what was even possible in itself. The writings of travellers, historians, geographers, philosophers, and physicians, are all laid under the contribution of his huge drag-net, but on the contents of which he bestows no selection. Hence, amid an immense congregation of absurdities, he tells stories of men without heads, and men without mouths, or of men having but one foot. Along with descriptions of the elephant and the lion he gives accounts of manticores, creatures with the head of a man and the tail of a serpent; winged horses; and of dolphins who became attached to children, and carried them on their backs every day to school, through lakes and arms of the sea; of ravens and cocks that spoke, and recognized by name different important personages. "More than two-thirds of his descriptions are erroneous, false, or fabulous."*

* Macgillivray.

They serve, however, when contrasted with the zoology of Aristotle, to bring into deserved prominence the inventor of an original system.

No real improvements in zoology were made during the next sixteen hundred years. In the 16th century a few writers appeared whose remaining works indicate the dawn of a brighter era. These deserve a brief notice in the succession in which they lived.

CONRAD GESNER, born at Zurich,—1516; a prodigy of application; but his works, though evincing some improvements in Botany, are now regarded as merely literary curiosities.

PIERRE BELON, in 1553; whose works exhibit some improvements in Ichthyology, particularly in the department of sea-fishes.

HIPPOLITO SALVIANI, A. D. 1554; whose works on Ichthyology contain still farther improvements, but are chiefly valuable on account of the beautiful and accurate plates which they contain.

GILLAUME RONDELET, A.D. 1554; whose works on Ichthyology contain some traces of classifications based on affinities.

ULYSSES ALDROVANDI, or ALDROVANDUS, who died A.D. 1605. He wrote thirteen folio volumes, four only of which were published by himself, namely, three on birds, and one on insects. The rest appeared after his death.

He can be regarded merely as a compiler — a modern Pliny.

With regard to all these, it is asserted by an

author well qualified to form the opinion,* that "their descriptions are wide, frequently incorrect, and in few cases characteristic. They had no idea of disposing the objects of which they treated in a manner resembling that to which we have been accustomed since the time of Ray and Linnæus."

It is now the place, agreeably to the object of the foregoing sketch, avowed at the commencement, to submit to the reader's attention the chief particulars in the history of the English Naturalist, Francis Willughby, Esq. of whom, although his name occurs in almost every treatise on Natural History, and often with high commendation, yet no *Memoir* has been published calculated to illustrate the varied excellencies of his character, or to do justice to the genuine claims of his improvements in science.

Francis Willughby was born at Middleton, in Warwickshire, in the year 1635. He was descended from two ancient families, each of the name of Willughby; namely, from that of Willughby de Eresby in Lincolnshire, a baronial family of high antiquity and historic renown, on his grandfather's side; and from the family of Willughby of Wollaton in Nottinghamshire, which derived its name from one of its earliest possessions, Willughby on the Wolds, in that county, on his grandmother's side. His grandmother's family derived its first prominence from the career of Sir Richard de Willughby, Knight,

* Macgillivray.

who was more than thirty years a judge of the King's Bench, and for some time Lord Chief Justice of England in the reign of Edward the Third.

It also numbered among its early members Sir Hugh de Willughby, Knight, who commanded a fleet of ships sent out in the year 1553, being the seventh and last year of the reign of King Edward the Sixth, to discover the north-east passage to Cathay,* and who perished in the ice.† The two families of Willughby de Eresby,

* "Cathay is the name for the six northern provinces of China, separated from the other nine by the great river Kiang.—*Philosophical Transactions, Munday, July 2d,* 1666."

† The event is alluded to by the author of the Seasons, in his description of Winter within the polar circles :—

——— Miserable they
Who, here entangled in the gathering ice,
Take their last look of the descending sun :
While, full of death, and fierce with tenfold frost,
The long, long night, incumbent o'er their heads,
Falls horrible. Such was the Briton's‡ fate,
As with first prow (what have not Briton's dared!)
He for the passage sought, attempted since
So much in vain, and seeming to be shut
By jealous Nature with eternal bars.
In these fell regions, in Arzina caught,
And to the stony deep his idle ship
Immediate seal'd, he with his hapless crew,
Each full exerted at his several task,
Froze into statues; to the cordage glued
The sailor, and the pilot to the helm.

THOMSON'S *Winter.*

‡ Sir Hugh de Willoughby.

and Willughby of Wollaton, were united in Sir Francis Willughby, Knight, the father of the subject of this memoir. He was the son of Sir Perceval Willughby, Knight, of the house of

Some account of this unfortunate expedition may not be unacceptable.

Sebastian Cabot, a native of Venice, arrived in England, and settled at Bristol in the reign of Henry VII. That monarch, disappointed in his hopes of forming an engagement with Columbus, gladly extended his protection to Cabot, whose reputation was scarcely inferior to that of the celebrated Genoese. Accordingly, Cabot received from him a patent, dated March 5, 1496, "to go in search of unknown lands, and to conquer, and to settle them." Cabot "concluding, by reason of the sphere, that if he could sail by the north-west, he should, by a shorter tract, come to India, he advertised the king thereon, who immediately commanded two caravels to be furnished with all things appertayning to the voyage, which was, as far as he remembers, in the year 1496, in the beginning of summer."

The result of the voyage disappointed his expectations, and he retired to Spain. He returned to England, however, in the year 1548, when Henry VIII. was on the throne; and on the accession of Edward VI. he was created "pilot major," and made "governor of the mysterie and company of the marchants adventurers for the discoverie of regions, dominions, islands, and places unknowen."

By his advice, and under his direction, a voyage was undertaken for the discovery of a north-east passage to Cathay. Three ships were accordingly fitted out for the enterprise, of which Sir Hugh de Willoughby was appointed captain-general.

So confident of success were the promoters of this design, that they omitted no precautions, which were

Eresby, by the eldest daughter and co-heiress of Sir Francis Willughby, Knight, of Wollaton, and inherited part of the great possessions of his maternal grandfather, including the stately

deemed necessary for the safety of vessels having to navigate Indian seas, causing them to be sheathed with lead, in order to defend them frrom the worms that are found so destructive in warm climates, and which is the first recorded instance in English history of a precaution which had often been previously adopted by the Spaniards.

The following particulars respecting the expedition are taken from Hakluyt's Collection of Voyages, vol. i. page 226, &c. printed 1559.

The names of the ships were,—

1. The Bona Esperenza, admiral of the fleet, "of 120 tunnes burden, having with her a pinnesse and a boate;" William Gifferson, master.

2. "The Edward Bonaventure, of 160 tunnes, with her pinnesse and a boate. Richard Chancelor captain, and pilot-major of the fleete."

3. "The Bona Confidentia, of 90 tunnes, having with her a pinnisse and a boate." Cornelius Durforth master of the ship.

These several descriptions of the ships are followed by a list of the names both of officers and men belonging to each.

Then comes, "the juramentum or othe ministered unto the captaine, and the othe to be ministered unto the master of the ship."

Then, a copy of "the ordinances, instructions, and advertisements, of and for the direction of the intended voyage for Cathay, compiled, made, and delivered by the Right Worshipful M. Sebastian Cabota Esquier, governour of the mysterie." &c. dated the 9th day of May, in the yere of our Lord God, 1553, and in the 7th yere of

mansion of Wollaton Hall, in Nottinghamshire, and Middleton Hall, in Warwickshire. He married the Lady Cassandra, daughter of the Earl of Londonderry, and had one only son,

the reigne of our most dread soveraigne Lord, Edward VI.

This document, consisting of thirty-three articles, is interesting in several respects.

It assumes, in an official manner, the influence of Christian principles, as the source of duty in the several individuals concerned in the voyage.

It also contains a direction, that "morning and evening praier, with other common services appointed by the king's majestie and lawes of this realme, be reade and saide in every ship daily; in the admiral, by the minister, (whose name appears to have been Richard Stafford,) and by the marchant, or some other person learned, in the other shippes; and the Bible or paraphrases to be read devoutly and Christianly to God's honor, and for his grace to be obtained, and had, by humble and heartie praier, for the navigants accordingly."

There are also very strict regulations against "carding, dicing, and such other divelish games."

In the twenty-second article, direction is given "not to disclose to any nation the state of our religion, but to passe it over in silence, without any declaration of it, seeming to have with such lawes and rules as the place hath where you shall arrive."

Some other instructions are characteristic of the simplicity of the times, for instance:—

"Item 30. If you shall see any people weare lyons or bearrs skinnes, having long bowes and arrowes, be not afraid of that sight, for such be worne often times more to feare strangers than for any other end."

"Item 31. There are people that can swimme in the sea, havens, and rivers, naked, having bowes and shafts

Francis, our naturalist, and two daughters: Letitia, married to Sir Thomas Wendy of Haslingfield in Cambridgeshire, Knight of the Bath; and Catherine, married to Clement Winstanley, Esq.

coveting to draw nigh your ships, which, if they shall find be not well watched or warded, they will assault, desirous of the bodies of men, which they covet for meate; if you resist them, they dive, and so will flee, and, therefore, diligent watch is to be kept in some islands both night and day."

Twelve counsellors were appointed for the voyage, by whom "every measure which might be deemed expedient, was to be considered and determined agreeably to instructions." There is also a Latin and English copy of the "letters missive which the right noble Prince Edward the Sixth sent to the kings, princes, and the potentates inhabiting the north-east parts of the world, towards the mighty empire of Cathay: at such time as Sir Hugh de Willoughby, Knt. and Richard Chancelor, with their company, attempted their voyage thither in the yeere of Christ, 1553, and the seventh and last yeere of his raigne."

A note is added, stating that these letters missive "were written in Greeke and divers languages." "These foresaide ships, being fully furnished with their pinnisses and boates, uel-appointed with all manner of artillerie, departed from Ratcliffe and haled unto Deptford the 10th day of May, 1553."

Then follows the diary of Sir Hugh Willoughby, beginning with May 11th, 1553, with their departure from Deptford.

A few extracts from it may be permitted.

"The 11th day, about two of the clocke, we departed from Deptford, passing by Greenwich, saluting the King's majesty then being there; shooting off our ordnances, and so haled to Blackwall, and there remained until the 17th

It is not known where Mr Willughby received the first part of his education. His character in youth, and throughout his life generally, is thus depicted by his most intimate friend and faithful

day; and that day, in the morning, we went from Blackwall and came to Woolich by nine of the clocke, and there remained one tide; and so the same day unto Heyreth." "The 18th from Heyreth to Gravesende, and here remained until the twentieth day, that day being Saterday; and from Gravesende unto Tilburie Hope, remaining there until the twentieth day."

The fleet appears to have encountered adverse winds during its whole passage down the river: and this is, perhaps, partly the reason why they are recorded to have cast anchor almost as regularly as the evening came. Similar impediments seem to have opposed themselves, after they had ventured into the sea, frequently occasioning them to put back to land.

The following is the extract for July 30:—"Stanfew harber, Lofoot, Leynam, and Finmark;" and for the 2d of August, "From that day came winde and terrible whirle-winds, so that we were not able to bare in, but by violence were constrained to take the sea again; and our pinnesse being unshipped. We sailed north and by east, the winde encreasing so sore, that we were not able to beare any saile; but took all in, and lay adrift, to the end to let the storme pass over. And that night, by violence of winde and thicknesse of mists, we were not able to keepe together within sight; and then, about midnight, we lost our pinnesse, which was a great discomfort to us. As soone as it was day, and the fogge ouerpast, we looked about, and at the last we descried one of our shippes to leeward of us, when we spred an hullocke of our foresaile, and bare roome with her, which was the Confidence, but the Edward we could not see."

The diary thenceforward consists of little more than an

editor of his principal works, his constant companion, and protegée in science, the Rev. Mr Ray, in his preface to the English edition of Mr Willughby's Ornithology. "He was endowed

account of the various bafflings which were met with in the endeavour to sail in the given direction.

The last entry is dated September 18, in these words:— "The next day, being the 18th of September, we entered into the haven, and there came to an anker at 6 fadoms. This haven runneth into the maine about two leagues, and is in bredth halfe a league, wherein were very many seale fishes, and other great fishes: and upon the maine we saw beares, great deere, foxes, with divers strange beasts, and gulloines, (in the margin, ellons,) and such other, which were to us unknown and wonderful. Thus remaining in this haven by the space of a weeke, seeing the yeare farre spent, and also very evill wether, as frost, snow, and haile, as though it had been the deepe of winter, we thought best to winter there.

"Wherefore we sent out three men south-east, three daye's journey, who returned without finding of people, or any similitude of habitation."

Hakluyt states that "the two following notes were written on the outside of the pamphlet or booke:"—

1. "The proceedings of Sir Hugh Willoughbie after he was separated from the Edward Bonauenture.

2. "Our shippe being at anker in the harber called Sterfier in the island Lofoote."

There is also a marginal note in Hakluyt as follows:—

"Here endeth Sir Hugh Willoughbie his note which was written by his own hand."

Then follows this statement:—

"The river, or haven, wherein Sir Hugh Willoughbie, with the companie of his two ships, perished for cold, is called Arzina, in Lapland, neere unto Kezor. But it appeareth, by a will found in the ship, that Sir Hugh

with excellent gifts and abilities both of body and mind, a quick apprehension, piercing wit, sound judgment, and great industry. He was, from his childhood, addicted to study. Though duly prizing the advantages of birth, and fortune, and talent, he did not content himself therewith, or value himself on them, but laboured after what might render him more deservedly honourable, and more truly to be called his own,* as being obtained by the concurrence at least of his own endeavours; and that as soon as he had come to the use of reason, he was so great a husband of his time, as not willingly to lose or let slip unoccupied the least fragment of it, detesting no vice more than idleness, which he looked upon as the parent and nurse of almost all others. He was also so excessive in the prosecution of his

Willoughbie and most of his company were alive in January, 1554. No lesse than 70 persons, including marchants, officers, and ship's company, perished with the gallant Sir Hugh Willoughby. The ships, and the dead bodies of those that perished, were discovered the following year by some Russian fishermen, and who found the papers from which the foregoing account is taken."

The reader will not have failed to notice in the preceding account, which is copied from Hakluyt, *literatim*, an indifference to authography in several words. This is also observable with regard to the name of the "captaine general," which is spelt at the top of the page, Sir Hugh Willoughbie, and in the course of the narrative, Willughby, though not unfrequently as at the top of the page also.

* "Vix ea nostra voco." This, like the mottoes to the arms of many other noble families of England, conveys a most useful admonition.

studies, and other employments, without any intermission or diversion, that most of his intimate friends were of opinion that he did much weaken his body and impair his health by his incessant labours and perpetual intention of his mind upon business. He was eminent for virtue and goodness; and wherewithal so truly humble, that I have never known any man of the meanest fortune or birth exceed him in that virtue. He despised no man for his poverty or mean parentage; honouring all men—affable to the meanest, not preferring himself before others, but condescending to men of low degree. He was so resolutely sober and temperate, that neither the importunity of company or pleasure of sense could ever tempt him to excess. Of that exemplary chastity and purity which not only condemned the dissoluteness of the age, but demonstrated the possibility of restraining and regulating those motions and desires which, of all others, are wont to be thought most violent and inordinate. So scrupulously just and righteous, that he had rather a great deal suffer wrong than do any. So true to his word and promise, that a man might safely venture his estate, and life too, upon it. So faithful and constant to his friend in all conditions, as well adverse as prosperous, that one might be secure of him, and confident of his help and assistance, whatever distress or calamity might befal one; he never deserting any man, only because fortune frowned on him, as the common sort of friends are wont to do. Of so diffuse and

comprehensive charity, that he could heartily affect and embrace all good men of all persuasions,—good men, I say, to exclude such opinions as are destructive of, or inconsistent with, true goodness.

"To these I may add his due fear and reverence of the Deity, deep sense of his goodness, and thankfulness of the same, and sincere piety in all his actions towards him, and great abhorrency of whatever tended to his dishonour." From such a confluence of excellencies, which Mr Ray declares he "never else beheld united in one person," what excellent, what memorable results might not be expected! Reasons will hereafter appear, which will render it in the highest degree probable, that the eulogium is as just as it is exalted,—a probability arising equally from Mr Ray's own most eminent integrity, and capability of appreciating whatever was admirable in the character of others.

Thus considered, it prepares us for the statement of Mr Willughby's attainments and performances, always, till of late years, undoubtingly ascribed to him as really his own, and questioned by some very modern writers simply because it appeared to them impossible that they could have been made by any one during so short a career. Before proceeding to trace his progress, which is intended to be done as much as possible through every year of his life, it may be permitted to confess the impression that there is a most marked agreement between the portrait of Mr Willughby, as

given at the commencement of this volume,* and his character, as thus delineated by his faithful and impartial friend, who was almost daily in his company during nearly half his life.

By the aid of merely that natural skill in physiognomy which most persons believe themselves to acquire in their intercourse with the world, it seems easy to read in his countenance that perfect subjugation of the animal propensities and omnipotent supremacy of intellect—that unearthly purity, modified by deep resources of benevolence—that accurate contemplativeness—which allied him to the sublimest occupations and purposes. It is our beau ideal of a naturalist's countenance.

In the year 1653, and the eighteenth year of Mr Willughby's life, we find him a fellow commoner at Trinity College, Cambridge. During his residence in the University, he formed an acquaintance with several persons, afterwards distinguished by their learning and talent, among whom were Mr, afterwards Dr, Isaac Barrow, the celebrated divine and mathematician; but the chief and most remarkable of his friends was Mr Ray, or *Wray*, as that eminent writer spelt his name at this period, and who, having been born in the year 1628, was seven years older than Mr Willughby; and having been chosen minor-fellow of Trinity in the year 1649, must have been a fellow of between three and four years

* It is derived from an original painting, now at Wollaton.

standing at the time Mr Willughby went to College.

Their friendship was founded upon the most complete congeniality of tastes and dispositions, and was so intimate and unbroken, as that the narrative of their respective lives will henceforth, to a considerable extent, be interwoven. The general events of Mr Ray's life will also be as often introduced in the following pages as may be consistent with the principal object. Mr Ray is justly characterized by a celebrated student in the same department of Natural History, in which he so conspicuously excelled, as "the most accurate in observation, the most philosophical in contemplation, the most faithful in description amongst all *botanists* of his own or of any other time."* It is asserted by many writers, that Mr Ray acted in the capacity of *tutor* to Mr Willughby while at the University, and that their friendship resulted from the mutual knowledge they acquired of each other in that relation,—an assertion far from impossible in itself, when their respective stations in the University, at the time Mr Willughby first entered, and the age of each of them, are considered. But no *proof* has ever been offered for the assertion; not the slightest evidence of it occurs in the letters or works of the parties themselves; and what is still more remarkable, is, that Dr Derham, who was

* Life of Ray, by Dr James Edward Smith, in Rees's Cyclopædia.

intimately acquainted with Mr Ray, and wrote his life, and edited his epistolary correspondence, amongst which are many of Mr Willughby's letters, never mentions or alludes even in the most distant manner to the circumstance. *

He frequently speaks of Mr Skippon, Mr Peter Courthope, Mr Bacon, and others, and often distinguishes them as Mr Ray's pupils, but although he much more frequently mentions Mr Willughby than any of these gentlemen, he never takes notice of *him* in that capacity.

It is stated in Dr Derham's Life of Ray, that he went to Cambridge, to Catherine Hall, at the early age of sixteen, distinguished among his

* The following sentence in Dr Derham's Life of Ray, seems studiously constructed with the view to avoid giving occasion to such an inference.

"Mr Ray having spent the latter end of this year, 1668, with his friends, Mr Barrel and Mr Courthope, at Danny, in Sussex, and Sir Robert Barnham, at Bocton, in Kent, (all three his pupils at Trinity,) and Mr Willughby in Warwickshire, he then, in July following, began another journey alone by himself," &c.

This passage refers to a period when the connection of all the parties with Cambridge had totally ceased for some years.

It should seem that, upon the supposition that Mr Willughby had been a pupil of Mr Ray while at the University, it would have been both the most natural, and the easiest procedure, for Dr Derham to have classed him along with the other gentlemen whom he mentions as "Mr Ray's pupils at Trinity." The distinction has all the appearance of having been made for the sake of accuracy.

other attainments by his knowledge in *Natural Philosophy;* and that his motive in "migrating" from that College to Trinity, after a residence of about a year and three quarters, was, that at the latter College, "the politer arts and sciences" were much more cultivated than at the former, where they chiefly addicted themselves to disputations.

It may, therefore, be probable that Mr Ray's early acquired and deeply cherished taste for the pursuits of science might have served to awaken similar inclinations in the mind of his friend Mr Willughby. There is also positive proof, that while at Cambridge, as well as in after life, they often examined, and searched, and explored together, and as will shortly be seen, that Mr Willughby, with others, assisted Mr Ray in his botanical investigations. It may also be inferred, from Mr Ray's superiority in years and knowledge, that Mr Willughby might have, on their first acquaintance, derived from him much skill and information; yet all this is not sufficient to justify the assertion, that Mr Willughby was Mr Ray's pupil,—an assertion made inadvertently in the first instance, and no doubt, afterwards, inadvertently copied.*

It may now be permitted to state the only evidence on this question which has presented itself to the writer of this memoir. In Cole's MS.

* Dr Smith's Life of Ray, in Rees's Cyclopædia, is an instance, perhaps, of the latter description.

of "Collections for an Athenæ Cantab," (now in the British Museum,) which was *intended* to have been to *Cambridge*, what Wood's Athenæ Oxonienses et Fasti, is to *Oxford*, the following passage occurs: — "Fra. Willughby, A.M. Col. Trinity, 1659, A.B. $16\frac{55}{0}$. Mr Willughby was *Mr James Duport's* pupil at Trinity College, to whom, and three others, he, Mr Duport, dedicated his Gnomologia, 1660.—BAKER."

Now, the only mention of the name Duport, in any possible relation to Mr Willughby, is that which occurs in Dr Derham's Life of Mr Ray, page 3.; in the following words, "When he, (that is, Mr Ray,) went to Trinity, he had the happiness to have *Dr* Duport for his tutor, a man well known for his learning, particularly for his great skill in *Greek*, which he gave the world good proof of in his Homerical Translations of Job, and other Hagiographa."

In Chalmers's Biographical Dictionary, the only instance of the name *James* Duport, is of this *Dr* James Duport, as appears by the translations of the Old Testament, which are in that account ascribed to him. Neither is any *other Duport* mentioned, except one *John* Duport, of the year 1580.

And in the Graduati Cantabrigienses, the *only* instance of *any* one of the name Duport, who, previously to the year 1787, had graduated in that University, is noticed in these words, "Duport, James, S.T.P. per literas regias, 1661." In Chalmers's Dictionary, it is said of him, that

he was admitted at Trinity College, 1622, and made Professor of Greek, 1632.

What, then, is the obvious inference from these statements, but this, that instead of Mr Willughby having been a pupil of Mr Ray, both Mr Ray himself, and Mr Willughby, were, at different periods of time, *each* of them pupils of Mr Duport; but whom, in consequence of his having, some time after Mr Willughby became his pupil, received the doctorate, Dr Derham, in his Life of Ray, speaks of by his latest and highest designation of *Dr* Duport? Nor is there any thing in the ages or standing of the parties, respectively, inconsistent with this inference. For, allowing that Duport, when admitted at Cambridge, in the year 1622, was twenty years old, which, in those times, was rather a late age for admission to the University, he would be about forty-two years old when *Mr Ray* became his pupil, and but little more than fifty years old when *Mr Willughby* became his pupil.

In the total absence of evidence to the contrary, and till *that* which is now produced is either invalidated or explained in some other way, the very general statement, which obtains in both English and foreign publications, that Mr Willughby was Mr Ray's pupil,* must be added to the numerous exemplifications already in existence, of the danger of one writer being contented

* In the *Biographie Universelle* the words are, "son gouverneur."

to retail assertions upon the credit of a predecessor, instead of having recourse himself to original sources of information.

It appears, from the authority already quoted, as well as from other sources, that Mr Willughby took his degree of bachelor of arts in the year 1655–6,—that is, when he was about twenty-one years of age; and in the year 1659, he took the degree of master of arts when about twenty-three years old. Nothing can be inferred as to the attainments made by Mr Willughby, in the usual studies of the University, from any public record; for, at the time he graduated, the names of the bachelors were simply arranged in alphabetical order, their respective merits not being at that time, and for many years afterwards, distinguished by any classification.

He resided, with some absences, much longer in the University than is usual, being most probably induced to do so by the continued residence there of Mr Ray, and of other friends of congenial habits, particularly those pupils of Mr Ray already mentioned. Mr Nid, a fellow of Trinity College, also then resident in the University, belonged to this society of scientific friends.

In the September of 1660,* Mr Willughby went "to sojourn" at Oxford for the benefit of consulting some rare works in the public library. In this year also Mr Ray published his first work, entitled "Catalogus Plantarum circa Cantabrigiam

* Wood's Fasti, 1660.

nascentium." The following words occur in the preface: — "Jam, quoniam honestum est fateri per quos profeceris, generossimi Juvenes, D. Franciscus Willughby et D. Petrus Courthope armigeri, natalium splendore, ingenii sublimitate, suavitate morum, fide, virtute illustres, non rei *herbariæ* solùm callentissimi, sed in omni literarum genere versatissimi, amici nostri, plurimum, honorandi, non sunt a nobis silentio transmittendi, ni ingrati aut arrogantes esse velimus. Horum operâ nos sæpius usos, et ab his non mediocriter adjutos fuisse, in hoc opusculo concinnando liberè at ingenuè profitemur." At the time Mr Willughby rendered to Mr Ray the assistance which he acknowledges with such high encomiums, he could scarcely have been twenty-five years old. He had also by this time entered on the study of insects; for referring to his discoveries in this department Mr Ray also writes in the Catalogus, p. 136,—"Ingeniosissimas vir et sedulus naturæ indagator D. Franciscus Willughby;" and on page 137,—"Observavit idem eruditissimus vir," &c.

Mr Nid died before the work was completed, as appears from these words in the same preface, —"Interea temporis fatis concessit amicissimus ille noster et individuus comes D. Joannes Nid, collegii S.; et individuæ Trinitatis apud Cantabrigienses socius senior meritissimus. Multis ille bonis flebilis occidit, nulli flebilior quam nobis."

Mr Ray preached his funeral sermon, in which he dwells much upon his many excellent qualities

from Psalm xxxix. 5.—"Verily, every man at his best estate is altogether vanity," and which is among his most admired productions as a preacher.

In the preface to the Catalogus Plantarum, he speaks of him as,—"Vir de republicâ literaria optimè meritus, antiquâ fide et sinceritate, singulari animi simplicitate et candore, vitæ probitate et innocentia, nec vulgari morum comitate et modestia conspicuus." The work in which Mr Willughby, and these other gentlemen, assisted Mr Ray, is not a mere catalogue of plants; it contains also a copious enumeration of synonyms, with the names of their authors, and is interspersed with numerous highly philosophical notices of the character and uses of the plants and trees found in the neighbourhood of Cambridge. It needs to be diligently perused, in order to perceive how much reading, accurate investigation, and diligent inquiry these early but enlightened botanists sent into the world under so modest a title. The names mentioned in it of the different places round Cambridge, in which they pursued their researches, revive recollections in the mind of a Cantab. He wanders with them in imagination "in the lanes and closes at Chesterton," "in the closes at Ditton," "Gamlingay," "Gog-magog hills," "Hill of Health," "on the moor at Cherry Hinton," "Kingston wood, and in the closes and cornfields fast by," "Madingly, in the wood, in the lanes and closes about the town," "Newmarket

about the town, on the heath," "on the bank of the great Ditch, called the Devil's Ditch," &c. Dr Derham, in his Life of Ray, says of this book, — "It proved of singular use in promoting the study of botany, hitherto much neglected both in Cambridge and in the kingdom generally; for after it was published, Mr Ray himself told me (than whom no man ever spoke with greater modesty of himself, or of his performances) that many were prompted by it to those studies, and to mind the plants they met with in their walks."

In the end of this year, 1660, peaceable times coming on, as Dr Derham observes, "by the restoration of the king and royal family," Mr Ray began to think of entering holy orders, and was ordained deacon and priest by Dr Saunderson, Bishop of Lincoln, December, 1660.* In

* The fact that Mr Ray should have *preached*, as he is stated to have done, *before being ordained*, is accounted for, by knowing that, during the interregnum, young men of known talent, learning, and piety, were allowed to deliver what were called "commonplaces," a species of sermon, both in the chapels of their several colleges, and even in St Mary's Church before the University. The foundation of several of Mr Ray's works published in subsequent years was laid in these commonplaces, particularly his valuable treatise on the Wisdom of God in Creation, and his Physico-Theological Discourses concerning the Chaos, Deluge, and Dissolution of the World. Dr Tenison, Archbishop of Canterbury, said of his talents as a preacher, that "he was much celebrated for his preaching solid and useful divinity, instead of that enthusiastic stuff which the sermons of that time were generally filled with."

consequence of the favourable reception the Catalogus Plantarum met with, Mr Ray resolved to extend his acquaintance with English plants; and having already taken one excursion for this purpose alone in the month of August, 1658, he set out on another in company with Mr Willughby in July, 1661. They started from Cambridge on the 26th, and travelled northward, proceeding through Huntingdon, Stilton, Peterborough, Lincolnshire, Yorkshire, the Bishoprick of Durham, Northumberland, and so into Scotland as far as Glasgow and Stirling, and thence back again through Cumberland and Westmoreland to Cambridge. They seem to have observed whatever was worthy of notice,—churches, cathedrals, monuments, inscriptions, customs, natural productions of various kinds, trades, commerce, &c.—still, however, keeping their botanical pursuits chiefly in view, and in which they discovered numerous plants. They finished their journey August 30, 1661. This, with other of their excursions for scientific purposes, is published in Dr Derham's Life of Ray, under the name of Itineraries. In the Philosophical Letters there is one* from Mr Ray to Mr Willughby, dated, "Coll. Trinity, Feb. 25, 1659," but which was more probably written some time in the year 1660 or 1661, in which Mr Ray submits to him "one or two of his designs," desiring his "sentence and opinion of the whole; and then, in case of his

* Page 355.

approbation, his particular directions as to the management and carrying on."

After reminding Mr Willughby that they had "lately, out of Gerard, Parkinson, and Phytologia Britannica, made a collection of rare plants, whose places are mentioned therein, and ranked them under their several counties," he proceeds to state his intention to carry on and perfect the design, for which purpose he was "writing to all his friends and acquaintance who were skilful in herbary, requesting them the next summer each to search diligently his country for plants, and to send him a catalogue of such as they might find, together with the places wherein they grow. In divers counties I have such as are skilful and industrious. For Warwickshire and Nottinghamshire I must beg your assistance, which I hope, and am confident, you will be willing to communicate." He then proceeds to state the plan of his work, which, he adds, "it will require some years to compleat."

Mr Ray published this work A.D. 1677, under the name of Historia Plantarum, and inscribed it to his friend and patron, Mr Willughby.

There are no means of ascertaining positively how far Mr Willughby assisted him agreeably to his request.

In the month of May, 1662, Mr Ray and Mr Willughby set out from Cambridge on another itinerary, passing through Northamptonshire, Warwickshire, Staffordshire, Cheshire, several counties of Wales, returning by Gloucestershire,

Somersetshire, Devonshire, Cornwall, Dorsetshire, Wiltshire, and Hampshire in July following, noticing a multitude of objects, which may well be supposed to have interested men whose attention was not confined to one branch of Natural History, but who, knowing the relation to each other of all objects of knowledge, near or remote, extended their acquaintance to whatever presented itself, while, nevertheless, pursuing chiefly one particular design.

Among other things, they noticed, on their way from Nantwich to West-Chester at Birkly, "a pool on my Lord Cholmondeley's ground, made by the falling in of the earth about the year 1657; and which," adds Mr Ray, "Mr Willughby has described." This description is not, however, to be found.

This second excursion is still more replete with interest than the former; both are written without distinguishing what *each* observed *separately*. They are the Diary, or, as Dr Derham has rightly named them, the "Itineraries" of their observations, as it should seem daily committed to writing by one of them in the name of both.

Mr Willughby probably continued his journey alone for a short time; for in the Philosophical Letters he writes to Mr Ray,*—"I met with several adventures in the remaining part of my journey after I left you. You may remember the day we parted I had intended to have gone

* Page 5. The letter is not dated.

to Cirencester, but hearing by the way of a great deal of treasure that was found in a field, I presently conjectured that it might be a Roman coin, and directed my course thither. The field was near Dursly, a town we left about a mile of the left hand as we rode from Glocester, where I found above forty people digging and scraping, and bought a great many silver medals of them, and one incomparable fair one of gold that had been found a little before. The whole history how these came to be discovered I shall reserve till I see you. I thought to have made strict inquiry after the snap-apple bird, but falling very sick at Malverne, I was forced to give all over." There is also proof that Mr Willughby had, by this time, made high attainments in mathematical learning. In the Philosophical Letters there are two addressed to him by Dr Barrow; the one dated Trin. Coll. March 26, 1662, and the other, October 5, 1665.

In the first of these, Dr Barrow speaks of Mr Willughby's observations concerning "the spiral line, as having sufficiently evinced the invalidity of a supposed demonstration concerning its equality with the semi-periphery." In the second letter, he says,—"Your discourse inferring the solidity of the sphere from the surface, by comparing *the concentrical surfaces* of *the sphere with the parallel circles of the cone*, is very ingenious and solid," &c. "Your observation about the equality of the annuli, with spherical portions, is also true and ingeniously proved."

Mr Willughby was one of those gentlemen to whom Dr Barrow dedicated his edition of Euclid. In Coles's manuscript already quoted the following passage occurs,—"Mr Barrow sayth that he never knew a gentleman of such ardor after real learning and knowledge, and of such capacities and fitness for any kinde of learning. See Dr Jo. Worthington's letter, dated Mar. 9, 1659."

The reason why so little is heard of Dr Barrow in Mr Willughby's memoirs, may be, that he was abroad during several years subsequently to the date of the letters referred to.

During all this time, Mr Ray continued to be fellow of Trinity College, having since his election held several offices of trust and honour in that society—as prælector, primarius, junior dean, and college steward. The latter office he had held about two years, having been sworn in to it on the last occasion, in December, 1660. An event now occurred which disturbed his tranquillity, and both tried and evinced the integrity of his moral principles. The reader would not excuse the history of this circumstance being passed over in silence, although it is not *immediately* connected with the memoir of Mr Willughby. The event alluded to was the Bartholomew act, otherwise called the new act of uniformity, passed in the year 1662. This act did not require an attestation from persons in holy orders against the Solemn League and Covenant, which, there is every reason to think, Mr Ray would most willingly have subscribed to,

for he was known to have frequently declared, that he considered it an unlawful oath; and in the total absence of proof to the contrary, his observations in the memorandum of his mother's death, which will be hereafter quoted, and his own avowal when on his deathbed to the Rev. Mr Pyke, rector of Black Notley, his native village, concur to prove that he had been, throughout his whole life, and from principle, a sincere and most cordial member of the Church of England. But the Bartholomew act required of him to sign a declaration that such persons as *had* taken the oath of the Solemn League and Covenant were "under no obligation to that oath." "He feared they might be."* He consequently was unable conscientiously to sign the declaration; and his scruples cost him his fellowship; and as they never were removed, he was disabled throughout the rest of his life from holding any ecclesiastical office whatever. Thirteen fellows of different colleges in Cambridge, and one master of a college, along with upwards of two thousand other divines in various parts of the kingdom, were also ejected from their livings for the same reason.

It is not necessary to form any opinion of the abstract question itself, in order to appreciate the uprightness of Mr Ray's conduct on this occasion. It is sufficient to know that he considered it an act of *doubtful* propriety to sign the

* Derham's Life of Ray.

declaration; for he is stated to have "feared" only that the oath was binding on those who had taken it; and sooner than endanger the violation of his conscience, he renounced the fairest worldly anticipations, which his own talents and acquirements, and the influence of his connections, might have justified him in entertaining. If it be also considered that his parents were in very humble circumstances, and that there is no evidence of his having amassed a sufficiency at this time of his life, being then only thirty-four years old, and that he thus deliberately threw himself upon his own exertions, and possibly on the bounty of his friends, and also, what to a man of his deep and ardent piety must have been a source of great and lasting regret, that he, at the same time, lost all opportunity of exercising his sacred function in a communion which, "upon a serious and impartial consideration," he preferred as "pure in doctrine, decent in worship, and agreeable to the word of God," and the scruples against which he declares himself to have thought "unreasonable and groundless,"* his determination must be considered as a sacrifice to the cause of truth and virtue infinitely more illustrious than all his scientific acquisitions and honours. Partisans of all kinds, when their cause is emerging from depression, are apt to think that a peculiar liberty of conscience and action is allowable as a reprisal for their previous denials, and to

* "His dying words," added to the "Philosophical Letters."

regard the return of advantages as a reward justly due to their constancy; nor is evidence wanting that many of the clergy of those times countenanced each other in the employment of ingenious methods of removing their scruples: but the integrity of Mr Ray was of that genuine character which declines all parley with temptation. It required not for its development the assertion of some absolute and untamperable falsehood. It was sufficient that the case was doubtful; and like the apostle St Paul, he considered that "whatsoever is not of faith is sin," that whatever is done without a full persuasion of its lawfulness, is, as far as the individual himself is concerned, unjustifiable and wrong Nor did length of time, or the approach of old age, or the occurrence of tempting opportunities, or the emulation of the successes and advancement of others, cause any relaxation of his principles. In reply to a letter, in which Dr Lister had expressed a hope that he would avail himself of the opportunity afforded by the recent elevation of his friend, Dr Wilkins, to the Episcopal office, he writes,—"D. Wilkins, in episcopalem cathedram evectum, et sui, sius, et mei, et præcipue ecclesiæ causa vehementer gaudeo: *me* tamen per *eum ecclesiæ restiturum iri, stante sententia*, plane est impossibile, nec enim *unquam* adduci me posse puto ut *declarationi subscribam* quam lex non ita pridem lata presbyteris aliisque ecclesiæ ministris injungit, nec tamen tanti est jactura mei qui nulli fere usui ecclesiæ futurus essem utut (quod dici

solet) rectus in curiâ starem."* Soon after the forfeiture of his fellowship, Mr Ray left Cambridge, as also did Mr Willughby; "and now having," as he says in the preface to his foreign travels, "gone over the greatest part of England in search of plants, and sufficiently informed himself what sorts his own country produced, he grew desirous to see what variety other countries of a different soil and temperature of air might afford. For which reason I was easily induced to accompany Francis Willughby, Esq. Phillip Skippon, Esq. and Nathanael Bacon, Gent. on a voyage beyond seas." These four gentlemen passed over from Dover to Calais, April 18, 1663. Mr Willughby was then in his twenty-eighth year. Before beginning to trace their progress as far as may be, it is needful to remark, that, on the 22d of April in this year, the Royal Society received its charter from Charles II. It had, previously to this date, consisted merely in private meetings of some scientific gentlemen. Upon its incorporation it received permission to *declare* within two months who were its members, and afterwards to *elect* upon the charter. On the 22d of May following the *declaration* was published, containing, among others, the name of Francis Willughby.

The King of France having recently commanded all the English to withdraw themselves and their effects out of his dominions, our travel-

* Phil. Let. p. 35.

lers were unable to make the grand tour, but took the direction of the Low Countries, and proceeded through Germany, Switzerland, Italy, reaching as far as Sicily and Malta. The immense variety of topics on which they bestowed examination, "natural, topographical, moral, physiological, politics, literature, mechanics, antiquities, and other curiosities," renders it impossible to give any idea of their vigilance and activity.* A catalogue of the plants which they discovered is added to the volume, and is a proof of their amazing industry in their botanical researches.

In this expedition, Mr Ray is said to have observed many plants in Switzerland, which, in the judgment of Haller, were not known even to the natives of that country. At Montpelier they separated, Mr Ray, Mr Skippon, and Mr Bacon, returning to England, and Mr Willughby, accompanied by a merchant, beginning his travels in Spain, August 31, 1664. Mr Willughby's diary, after their departure, of what he saw in Spain, is characterized by the same multi-variety of subjects. It is an admirable specimen of minute observation upon every thing that presented itself to his notice. He also wrote to Mr Ray, giving him an account of the principal things he had seen since they parted. To the great regret of the travellers, all the papers belonging to Mr Willughby and Mr Ray, in which they had very accurately described all the birds, fishes, &c.

* Title page to "the Travels," &c.

which they had seen in High and Low Germany, and especially about the Danube and the Rhine, were lost on their return.* This event, no doubt, occasioned the work of Mr Willughby on fishes to have been far less perfect than otherwise it would have been. Mr Willughby made a collection, during his travels, of birds, fishes, shells, fossils, seeds, dried plants, coins, many of which are now in existence at Wollaton Hall.

While he was in Spain, he found a letter from Dr Wilkins, Bishop of Chester, importunately urging him to make a voyage to the Peak of Teneriffe, adding, that if Mr Willughby must return home, and Mr Ray would undertake it, the Royal Society would defray all the expenses and send to him at Cadiz all necessary instructions, and a catalogue of the observations which they desired to have made.

December 17, 1665, Mr Willughby being in the thirtieth year of his age, lost his excellent father, Sir Francis Willughby, Knt. and became possessed of his estates, and with them, of the noble mansion of Wollaton Hall in Nottinghamshire, and of Middleton Hall in Warwickshire; the latter of these became his general place of residence during the remainder of his life, though we sometimes find him at Wollaton Hall, and some of Mr Ray's letters to different persons are dated thence. At Middleton Hall he had a good library, classical and philosophical, containing

* Philosophical Letters, p. 180, 181.

also all the works on natural history, and many French and Italian works collected in his travels. These are now at Wollaton.

Much of the year 1666 was passed at Middleton Hall.

In the Philosophical Transactions, dated "Munday, September 9, 1666," may be found the observations that were made at London by Mr Willughby, Dr Pope, Mr Hook, and Mr Phillips, on the late eclipse of the sun, which happened on the 22d of July, 1666. This paper relates to observations made from the commencement of the eclipse, which was 1 hr. and 54 min.; its greatest obscurity somewhat less than 7 digits.

"About the middle, between the perpendicular and westward horizontal radius of the sun, viewing it through Mr Boyle's 60 foot telescope, there was perceived a little of the limb of the moon without the disk of the sun, which seemed to some of the observers to come from some shining atmosphere about the body either of the sun or moon."

They affirm to have observed the figure of this eclipse, and to have measured the digits, by casting the figure through a five foot telescope "on an extended paper fix't at a certain distance from the eyeglasse, and having a round figure; all whose diameters were divided by six concentrick circles into 12 digits." "These observations were made in conjunction with others made at Madrid and Paris, and exhibit those coincidences and differences to be expected from the several

positions at which the observations were severally taken."

In the October of this year, Mr Willughby received the following letter from Bishop Wilkins, preserved in the Philosophical Letters,* requesting his assistance in the formation of his work, "Real Character and Philosophical Language."

October 20, 1666.

SIR,—I venture this letter, not without some doubt whether it will be likely to find you at home or not.

I thought it fitting to inform you that the late fire hath destroyed all the impression that was wrought off,—namely, forty-two sheets of the book I was printing,† excepting only one copy of each sheet, which was sent to me from the press, which I had with me in the country, besides the written copy of the whole second book, and the Dictionary from the beginning of the letter R, which I had likewise sent entire to the press, the renewing of which will be no small trouble and difficulty to me. But I am not hereby discouraged from the thought of beginning again; only, before I set about it, I must desire your best assistance for the regular enumeration and defining of all the families of plants and animals. I thought to have found great benefit in this kind, by Dr Merret's late book, but it hath not answered my expectation; nor do I know any person in this

* Page 366.

† Note to this letter.—"This was his Real Character

nation, who is so well able to assist in such matters as yourself, especially if we could procure Mr Ray's company to join in it. I would fain know whether you are like to come up to town for any time this winter, and when, that I may farther consult with you here; if not, I would be willing to wait upon you in the country, where I suppose you have all the books necessary for such inquiries, but then I would earnestly hope that we might have Mr Ray's company and help if you can contrive it. If I could fully satisfy myself in the methodical enumeration of such things, I would put out the next edition in folio, with handsome cuts, of all such things as are fit to be represented in figure. If you can afford me any of your time at present, for the digesting of these matters, I will get what I have done transcribed and sent down to you, that you may add thereto or alter it as you think fit. I hope at your next opportunity to hear from you.—I am, &c.

In the dedication to the Real Character, the Bishop says, "In doing these things, I have not neglected any help that I could procure from others, and must acknowledge myself much engaged to sundry learned men of my acquaintance, for their directions and furtherance in such matters as were most suitable to their several studies and professions. Amongst the rest, I must not forget to make particular mention of the special assistance I have received in drawing up the tables of *animals*, from that most learned and inquisitive

gentleman, and worthy member of the Royal Society, *Mr Francis Willughby*, who hath made it his particular business, in his late travels through the most considerable parts of Europe, to inquire after and understand the several species of animals, and by his own observations, is able to advance that part of learning, and to add many things to what hath been formerly done by the most learned authors of his time.

"And as to those most difficult tables of plants, I have received the like assistance from one of his companions in travel, Mr John Ray, late fellow of the Trinity College; who, besides his other general knowledge, hath, with great success, applied himself to the cultivating that part of learning."

It may be observed upon this extract, that Dr Wilkins, who must have well known the qualifications of the two individuals, acknowledges his obligations to Mr *Willughby alone*, for the contributions that referred to the *animal* part of creation, and to Mr *Ray* for contributions for the tables of *plants*.

One of the Philosophical Letters* from Mr Ray to Mr Lister, written from Notley, probably in October of this year, refers to Mr Willughby's indefatigable pursuit of the study of insects,—"Alia Insectorum genera non omninò neglexi at verò cùm Ds. Willughby iis conquirendis, examinandis describendis, conferendis, sedulam *a*

Page 35.

multis retrò annis navavit operam, ego obiter tantum et animi causâ hâc in parte versatus sum."

Similar notices may be found in several other letters of different dates. In one, dated June 29, 1670, it appears that he had greatly extended Mr Lister's enumeration of English spiders. Other letters in that interesting collection of the correspondence of several of the most eminent men of that time, relate to his observations on a variety of other topics.

The greatest part of the winter Mr Ray was occupied in reviewing and helping to put in order Mr Willughby's collection of birds, fishes, shells, stones, and other fossils, seeds, dried plants, coins, &c.; and in conjunction with Mr Willughby, in rendering to Dr Wilkins that assistance, by framing his tables of plants, quadrupeds, birds, fishes, &c. for the use of the Universal Character, which he had requested. "Of these tables," Dr Derham says, in his Life of Ray,* "they were partly drawn up by Mr Willughby and Mr Ray, who were the best able of any men living for such an undertaking. But yet, when they had done it, I find they were not well pleased with it, thinking it imperfect, and capable of great amendments, which they afterwards gave it in their histories of plants and animals.

But it is not at all to be wondered, that such an account should be defective at the beginning,

* Page 21.

before they had fully weighed and considered so new a subject, as that was, at that time, a part of learning but little studied and cultivated, that lay confused, and without any, or no better than no method, but which those two great men so cleared up, methodized, and advanced, that to them may be ascribed a great deal of that perfection to which Natural History is now arrived."

In the year 1667, Mr Willughby being in the thirty-second year of his age, and still intent on prosecuting his researches into Natural History, undertook another journey in company with Mr Ray, into the west of England.

They set out from Mr Willughby's seat at Middleton Hall, on June 25th, and travelled through the counties of Worcester, Hereford, Gloucester, Somerset, and Devon, into Cornwall, as far as the Land's-end, where they arrived August 17th, and thence returned through Hampshire to London on September 13th following. In this journey, they described many fowls, fishes, and plants, and took notes of the mines and method of making salt, &c.

So great and deserved was the reputation which Mr Ray had now obtained, that he was in this year invited to become a member of the Royal Society, and was admitted a fellow November 7th.

In the year 1668, in the thirty-third of his age, Mr Willughby married Emma, second daughter and co-heiress of Sir Thomas Bernard, and by whom he had three children, Francis, Cassandra, and Thomas.

In the spring of the year 1669, Mr Willughby and Mr Ray entered upon a course of inquiries into the theory of vegetation. They first devoted their attention to the motion of the sap in trees; the results of their inquiries were communicated to the Royal Society, and appeared soon afterwards in the Philosophical Transactions. The probable reason why they did so was, the discovery of the circulation of the blood in animals, *published* only about forty years before by Dr Harvey, although he had for some years *taught* the doctrine in his lectures to his pupils. They perhaps expected to find something equivalent in the constitution of plants.

The experiments made at that early period of the investigation may be perused with interest. It was considered that the following facts were established:—"That the sap of any tree, running down the side of it, or dropping on one place, will precipitate a kind of white coagulum or jelly; and this, it was imagined, might be the part which every year, between bark and tree, turns to wood, and of which the leaves and fruit are made.

"That a tree precipitates more when it is just ready to put forth leaves, and is about to cease dropping, than at its first bleeding: that the sap ascends, not only between the bark and the tree, but by all the pores of the wood. This was thought to be undeniably proved by boring in the same tree, just before the expansion of the leaves, holes of different depths, or the same hole

double the depth. For from an hole, suppose of two inches depth, will issue near double the quantity of what proceeds from an hole of an inch depth. So from the same hole, if it be bored on to double the depth it had, will issue double the liquor that first did."

Another experiment was instituted for the farther proof of the sap's ascent through the woody part of the tree.

"To put it out of all doubt," says Mr Ray, "we took away, on one side of a birch tree, bark and wood to a considerable depth, and bored an hole into the tree where the piece was taken away, out of which hole it bled copiously, notwithstanding we prevented any other sap coming on the filter but what proceeded from the hole."

These results being made known to the public, induced a great number of inquiries, relating to the proportion of the sap to the branches; the position of the branches, erect or otherwise; whether the sap flows from the tops when cut off, or from the end of the stalks only; also relating to the flowing of the sap in different kinds of trees, and the effects of temperature on these phenomena, and how far they are regulated by the age of the tree.

"In order especially to ascertain whether the sap ascended only, or descended also, we bored a hole into a large birch, out of which a drop fell every fourth or fifth pulse. Then about a hand's breath, just under the hole, we sawed into the body of the tree deeper than the hole, whereupon

the bleeding diminished about one half; and having sawed just above this hole to the same depth, the bleeding from the hole ceased quite, and from the sawed furrow below decreased one half; and it continued bleeding a great while after at both the sawed furrows, the hole in the middle remaining dry. We repeated this with much like success upon a sycamore."

"Some trees of the same kind and age bleed a great deal faster and sooner than others, but always old trees sooner and faster than young." "A wound made before the sap rises, will bleed when it doth rise." "While making these experiments, the weather changed from very warm to very cold; whereupon the bleeding in the birches, which began to abate before, ceased quite. But all the sycamores and walnut trees we had wounded bled abundantly, (some whereof before bled not at all, and those that did so but slowly,) and so continued night and day — when it froze so hard that the sap congelated as fast as it issued out. The cold remitting, the birches bled afresh, the sycamores abated very much, and the walnut trees quite ceased."

"We pierced two sycamores on the north and south sides of them, and both, from equal incisions, bled a great deal faster from the north sides than from the south."

These communications to the Philosophical Transactions induced many others, especially one written by Martin Lister, Esq. touching some inquiries and experiments on the motion of

the sap in trees, and relating to the circulation of the same, dated York, January 25, 167$\frac{9}{0}$, in which he says, that he was "actuated in his experiments by hopes of improving the notion of winter bleedings, so happily discovered by Mr Willughby and Mr Ray," and which succeeded so well that he "afterwards engaged himself in keeping a journal throughout the whole winter." The experiments of Mr Willughby and Mr Ray were verified and extended by Dr Ezekiel Tonge; also by Richard Reed, Esq. as appears in a letter dated March 14, 167$\frac{9}{0}$, at Lugwardine; also by Dr John Beal, May 13, 1671. These discoveries also suggested inquiries on the subject in Italy, as appears from the Philosophical Transactions, August 14th, 1671.

Dr Ezekiel Tonge stated, that the results of his experiments did not coincide, in some respects, with those of Mr Willughby and Mr Ray. Accordingly Mr Willughby wrote in a letter, dated Middleton, in Warwickshire, March 12, 16$\frac{6}{7}\frac{8}{0}$, explaining the causes of the disagreement; such as their being made in a different season, &c. and intimating his intention to prosecute these experiments in the ensuing year.

It should seem, that these experimentalists had, like the rest of the world till lately, not considered the distinction whether the sap is *quiescent*, or whether it *flows*, before perforations are made in a tree, neither took sufficiently into consideration the principle of life in vegetable bodies. At all events, it may be safely

asserted, that the main body of the sap being not returned to the point whence it was propelled, like the blood to the heart in animals, the term *circulation* of the sap, in the sense of its passing round in the same track, its motion constantly tending to the same point from whence it began, is not proved to be appropriate.* Mr Willughby also communicated many other papers during the same year, containing observations which he himself made on the black poplar, the dwarf oak, &c.

In the month of July, 1670, Dr Edmund King had communicated to the Royal Society some observations he had made on certain insects lodging themselves in old willows, curiously wrapt up in green leaves, in channels or burrows, each with twelve, fourteen, or sixteen leaves around the body, and several of them having as many little round bits of leaves at each end to stop them up close; which, thus made up, were near an inch long, put in one after another into a bore made in the wood fit for their reception, "resembling cartrages in powder wherewith pistols are wont to be charged, or like long slugs of lead; some placed so near as to touch, and others at a considerable distance, in burrows like those of rabbits."

The following are extracts from two letters by Mr Willughby to the publisher, from Astrop, August 19, and from Middleton, September 2,

* Rees's Cyclopædia; article, Circulation of the Sap.

1670, containing his observations, &c. on "cartrages," described in the preceding account.

"I had the good luck to find a great many of your cartrages in a rotten willow, and by the shape of the maggot was most confident they would produce insects of the bee tribe; and this I should have foretold you had I ever received those you sent me by Mr Le Hunt. But having only that one you sent me before, I was so fond and choice of it, that I durst not open it. I think that now I have found out the whole mystery; and if you please to send me Dr King's account, and one of your bees, I may perhaps add something, and shall be glad to be instructed in any thing that hath escaped me. I desire one of the bees, because all mine being of a late hatch, and none of them yet turned into 'nymphas,' (which is the word of art for the aurelia of the bee,) I fear I shall not see their last metamorphosis this year. In a garden, near a willow, I found where they get their leaves for their cartrages, which are not willow but rose leaves.

"At my coming home, I found the long expected cartrages, and some of the bees hatched; so that now we want nothing to complete their history. I will trouble you only with those particulars that I found not mentioned in Dr King's paper, to whom we owe the acknowledgement of these productions, and whose observations concerning them our experience hath since confirmed.

"Mr Snell, an ingenious gentleman, brought

of them to the wells at Astrop; who, directing me to the place where I got them, I have found great plenty in the trunk of a dead willow. Beginning to unfold some of them, Mr Wray immediately judged them to be made up of pieces of rose leaves, and called to mind, that this very spring a worthy friend of his, Mr Francis Jessop, brought him a rose leaf, out of which himself saw a bee bite such a piece, and fly away with it in her mouth.

"Thereupon, searching the rose leaves thereabout, we found a great many leaves with such pieces broken out of them as these cartrages are made up of, some of which I sent you enclosed in my last.

"The cuniculi or holes never cross the grain of the wood, excepting where the bee comes in, and where they open one into another. From the place of entrance they are wrought both downwards and upwards, so that sometimes the bee-maggot lies under her food, and sometimes above it. One end of the cartrage — namely, that which is next the entrance—is always a little concave; the other end, which is farther from the entrance, a little convex, and is received into the concave of the next beyond it. The sides of the cartrages are made up of oblong pieces of leaves, and pasted together; the ends of round ones; and whenever they do not lie close one to another, the intermediate space is filled up with a multitude of these little rounded pieces laid one upon another. The cartrages contain a pap or

batter of the consistence of a jelly, or something thicker; of a middle colour, between syrup of violets, and the conserve of red roses, of an acid taste, and unpleasant smell. In each of these, at the concave end, there lies one bee-maggot, which feeds upon the forementioned matter till it grows to its full bigness, and then makes and encloseth herself in a theca or husk of a dark red colour, and ovate figure, in which she is changed into a bee; the remainder of her food you may find dried into powder at the convex end, and her excrements at the concave without the theca. The bees I found in your box (which are the only ones I have yet seen) were of a shorter and thicker shape than the common honey bee, more hairy, &c. But the surest mark to distinguish them is, that the forcipes or teeth of these are bigger, broader, and stronger; in shape like those of a wasp or hornet; from which she also sufficiently differs in having a tongue like a bee, which they want.

" They made their way out along the channel *thorough* all the intermediate cartrages, and not thorough the solid wood. Of the corruption of the matter within the cases, when the bee maggots or nymphæ happen to miscarry, are bred like little hexapods, which produce beetles, maggots which produce flies, mites, &c. From what hath been observed concerning this tree, and by a great many more parallel instances, we may answer the quære of some that have written of bees, whether it be the old bee or the bee maggot

that covers the cells before the change? For here the old bee, when she hath provision enough, with an egg closes up the cartrage, and hath no more to do; the maggot, a great while after, making the theca, which is analogous to the cover of the cells."

There is another letter, relating to the subject of Mr Willughby's, dated July 10, 1671.

Among many other of his communications to the Philosophical Transactions concerning insects, there is one dated August 24, 1671, which deserves insertion.

The title of it is, "Concerning the Ichneumon Wasps, and their several changes, ways of breeding, especially that of laying their eggs in the body of caterpillars." The inquiries which it describes were suggested by the opinion of Mr Lister, that the ichneumon wasps so deposited their eggs.

"These insects have four wings, antennæ like bees, their body hanging to their breast by a very slender ligament, as in wasps; most, if not all, have stings, and come from a maggot which spins herself a theca before she turns into a nympha. There is a great variety of them. Some breed as bees do, laying an egg which produceth a maggot, which they feed till it comes to full growth; and others, as we guess, thrust in their eggs into plants, the bodies of living caterpillars, maggots, &c.

"For it is very surprising to observe, that a great caterpillar, instead of being changed into a

butterfly, (according to the usual course of nature,) should produce sometimes one, sometimes two, or three, and sometimes a whole swarm of ichneumones. I have observed this anomalous production in a great many sorts of caterpillars, both hairy and smooth; in several sorts of maggots, and which is most strange, in one water insect. When there come many of these ichneumon maggots out of the body of the same caterpillar, they weave all their thecas together into one bunch, which is sometimes wound with web about it just like a bag of spiders' eggs; but I dare venture to answer Mr Lister's tenth quære, page 21772 of the Philosophical Transactions, negatively, that none of them feed on spiders' eggs, but it is the similitude of those thecas conglobated together to the eggs of spiders, that hath occasioned this conjecture. One of the green caterpillars common on the heaths in the north, went so far on to her natural change that she made herself up into a great theca, almost of the shape of a bottle, which was filled with a swarm of ichneumones. And I have observed, in one or two other sorts, that from the very aurelia itself hath come an ichneumon; while it is very odd that the caterpillar, stung and impregnated by the ichneumons, should yet be so far unhurt and unconcerned as to make herself a theca, and to be turned into an aurelia. This year, being in company with an ingenious neighbour, we observed one haling a large green caterpillar, much bigger than herself, which, after she had drawn the

length of a pearch, she laid down, and then takes out a little pellet of earth, with which she had stopped the mouth of a small hole like a worm-hole; then she goes down into it, and staying a very little while, comes up again and draws the eruca down with her into the hole, and there leaves her; and afterwards not only stops, but fills up the hole, sometimes carrying in little clods, and sometimes scraping dust with her feet, and throwing backward into the hole, and going down after herself to ram it close.

"Once or twice she flew up into a pine-tree, which grew just over her hole, perhaps to fetch cement. When the hole was full and even with the superficies of the ground about it, she draws two pine-tree leaves and lays them near the mouth of the hole, and flies away.

Not taking notice that she came any more in three or four days, we digged for the caterpillar, and found it pretty deep. I put it into a box, expecting it would have produced an ichneumon, but it died away and nothing came of it. We lately observed a sort of ichneumon, or rather vespæ, which prey upon several sorts of flyes; when they fly with them, they hold them by the head and carry them under their bellies. These make holes a great depth in the ground, in which they lay their young ones, and feed them with the flies they catch, creeping backwards into the ground, and drawing the flies after them. I suspect they at first lay their eggs in the very body of a fly, but one fly being not enough to bring the

young one to its full growth, they feed it with more. Their thecas are at last all covered over with the wings, legs, and other parts of flies."

These observations of Mr Willughby caused many other persons to investigate the nature of these insects, their habits, &c. especially Dr Lister of York, as appears from letters from him in the Philosophical Transactions, dated October 16 and 28, 1671.

Thus we find Mr Willughby in the full pursuit of scientific objects, and with undiminished ardour and enterprise; and, as we are informed by Mr Ray, "having now made so good progress, that few of our European animals described by others had escaped his view, he was, at the close of this year, meditating a voyage into the New World, that he might, as far as in him lay, perfect his history of animals."

But the time was now nigh at hand when a career so honourable and useful was to be arrested by the unsparing hand of death. At the close of the year 1670, he experienced another of those attacks of illness which had, at different times during some years, been the cause of much anxiety to his friends.

In a letter from Dr Lister to Mr Ray,* dated December 22, he writes, "I am glad to hear that Mr Willughby is so near well again, and thank God for his recovery; and do heartily pray a continuance of good health to him. Methinks he

* Philosophical Letters, p. 80.

is very valetudinary, and you have often alarmed me with his illnesses."

It can scarcely be doubted but that, under the advantage of a good bodily constitution, which Mr Ray represents Mr Willughby to have originally possessed, these frequent attacks of indisposition, and even his premature death itself, are, partly at least, to be attributed to the excitement of a mind overwrought by incessant exercise. In his case, as in that of many other self-devoted victims to the cause of science, these premonitions of disease are regarded merely as hinderances, instead of being carefully obeyed; and the first opportunities afforded by an imperfect convalescence, are employed with redoubled energy as reprisals for previous delay. Hence those numerous instances in which the brightest expectations of usefulness and excellence have been annihilated in an early grave.

The accounts which remain of Mr Willughby's last illness are brief and indistinct. All that can be ascertained is, that, in the beginning of June, 1672, "he was seized with a violent pain in his head, which, in consequence of his using diascordium, removed to his side, and that he fell into a pleurisie, which terminated in that kind of fever called Cattarrhalis, within less than a month after he took to his bed." *

He died on the 3d of July, 1672. His faithful

* Ray's Preface to the English edition of Willughby's Ornithology.

and affectionate friend, Mr Ray, was with him, and speaks in strong, though merely general, terms, of his "patience and submission to the Divine will, which did eminently appear in the time of his sickness, when he professed himself contented to leave the world if it pleased God to have it so, though then in the height of his strength and parts, and in the hot pursuit of useful studies and designs, and in such circumstances as to his concerns in this world as rendered some continuance of life very desirable to him, and would have tempted a man of ordinary vertue to express some anger at the sentence and expectation of death." *

The following prayer, composed by Mr Ray on the occasion, and which, from its language, seems to have been offered in the midst of Mr Willughby's assembled family, breathes sentiments appropriate to the Christian and the friend. It is copied from Dr Derham's Life of Ray.

"O Lord! Thou hast been pleased to make a sad breach among us, to deprive us of our most dear friend and relation, — a person that was to some of us as the very light of our eyes, the joy of our hearts, the greatest outward comfort of our lives. Give us a sanctified use of this heavy affliction; and when our hearts are moved and affected with a sense of our loss, give us to consider our sins, and to spend some part of our tears in lamenting them. Give us to consider the vanity and uncertainty of our lives, and the

* Ray's Preface.

emptiness and insufficiency of all things here below, to satisfy the vast desires of our immortal souls. Comfort, O Lord, and support the hearts of thy servants who have the greatest interest in this loss, and be thou pleased also to counsel and direct them. Give us all, upon this occasion, to consider our latter end, and to prepare for it; to wait all the days of our appointed time, until our change come; to consider that we can die but once, and after death comes judgment; that upon this moment depends eternity; that as the tree falls, so it lies; as death leaves, so shall judgment find us; as we spend a few days here, so it will be with us for ever hereafter; that we must all appear before the judgment seat of Christ, to receive according to what we have done in the body, whether it be good or whether it be evil. Help us, therefore, to work while we have the light and the day, because the night comes in which no man can work, and to pass the time of our dwelling and sojourning here in thy fear. And for thy deceased servant, give us to imitate his meekness and humility, his temperance and sobriety, his exemplary chastity and purity, his dutifulness and obedience, his justice and righteousness, his faithfulness and constancy, his patience and submission to thy will, and all those other eminent graces and virtues wherewith thou wert pleased to beautify and adorn his soul; that so we, together with him, may, after this life ended, be made partakers of thine everlasting kingdom and glory in the world to come!"

Mr Willughby left five executors of his will, Sir Thomas Wendy, Mr Barnard, Mr Phillip Skippon, (afterwards Sir Phillip,) Mr Jessop, and Mr Ray; to the latter, as an additional mark of his esteem, he also bequeathed an annuity of £60 per annum, some say £70,* intrusting him also with the education and care of his sons, Francis and Thomas, the eldest not being four years of age. Francis, the eldest, was created a baronet by King Charles at ten years old, as an honour, no doubt, to the memory of his father. He died before he was twenty. Thomas, the younger son, was one of the ten peers created all on the same day by Queen Anne, and received the title of Lord Middleton. Their sister afterwards married the Duke of Chandos. Mr Willughby was buried in Middleton church. The following is a translation of the epitaphs over his parents, himself, and his son Francis, made by a late minister of the parish. The original Latin is said to have been written by Mr Ray, and to have all the charac-

* This discrepancy of statement may, perhaps, be accounted for by a circumstance mentioned in a letter from Thomas Willughby to Dr Sloane, dated Thurgunby, Mar. 27, (the year is not added,) contained in Ayscough's Collection in the British Museum.

"Sr. Having not been at Wollaton for some time, I had not your's till lately. I am very sorry Mr Ray left his family in so very ill a condition; every body, I believe, had a great value for him, and, knowing my father had so particular one, I have always paid him £12 more than I was obliged to do," &c. &c.

teristic elegance and vivacity of his style in that language.

On Mr Willughby's Father and Mother.

" Here lie interred, Francis and Cassandra Willughby. He was descended from the ancient family of the Willughbys, and she added to the lustre of that family, by the splendour of her own, being the daughter of Thomas Ridgway, Earl of Londonderry.

" Readers! are you desirous that I should briefly give you some idea of their characters? He, holding the command over his passions, rendered himself exemplary by the courtesy of his manners, by the cultivation of religion, and by a remarkable integrity of life. She, by the most exquisite accomplishments of mind and body, left to posterity a most happy example of conjugal virtues. He, by persevering vigour and prudence, restored, repaired, renewed his family property, not only injured, but almost reduced to a wreck. She, truly sharing in his fortunes, and following the footsteps of her husband, by the exercise of an acute understanding, and by a munificence frugally directed, extended, conducted, and, in a singular manner, adorned her domestic duties. She gave offspring to her husband, Francis, who is here buried; Letitia, the wife of Sir Thomas Wendy, Knight of the Bath; and Catherine, wife of Clement Winstanley, Esq. They died in mature age: the one on the 17th day of December,

A.D. 1665, in the 76th year of his age; the other, on the 25th of July, A.D. 1675."

Mr Francis Willughby's Epitaph.

"M. S."

"Near this spot lies Francis, the truly illustrious son of the best of parents. If piety, probity, truth, disinterested fidelity, a rigid observance of virtue, resolute sobriety, sincere wisdom, great learning without pedantry, religion without superstition, nobility without pride, have any thing illustrious in them, let all good men revere his worthy name!

"In the course of his life, after that he had investigated by travel the various characters of the nations of Europe, their languages, arts, manners, and laws, he cultivated and perfected the same in the retirement of his home.

"He penetrated into the recesses of mathematical science to others inaccessible. He searched out the various secrets of medicine; he so nicely examined the whole system of philosophy, that he restored its peculiar qualities and names to every part; he gave also a new arrangement to natural philosophy, and this he accomplished with so much skill, diligence, and fidelity, that he still appeared as a new, and unerring, and a faithful interpreter of nature. He married Emma Bernard, second daughter of Sir Henry Bernard, who was the mother of Francis, Cassandra, and Thomas. And now highly respected in life, and deeply regretted in death, he was numbered with im-

mortal spirits, on the 3d of July, 1672, in the 37th year of his age. The rest let a prayer express. May his sons, his grandsons, and their posterity, transcribe their father's character into their own!"

Epitaph over Mr Francis Willughby's Eldest Son, Francis.

"Near this place lies Francis Willughby, Baronet; a youth of almost prodigious promise, of most elegant manners, the most acute genius, a judgment manly even in youth, and mature in the powers of his mind, though not in age:

The eldest Son of Francis and Emma
Willughby. Snatched away by
an untimely fate, he bid farewell
to life, in the 20th year of his age, on
the 13th of July, which day was
the day of his birth and of his death.
O'er the warm ashes of the youthful dead,
The short-lived lily, rose, and violet spread,

Thomas Willughby, Baronet, has most devotedly consecrated this monument of ready affection and regret."

Mr Ray continued to reside at Middleton, engaged in the education of his friend's children. He was so conscientious in the discharge of this duty, as to refuse an inviting request from his scientific friend, Dr Lister, to take up his abode with him at York.

He soon began to provide for the future wants

of his infantine pupils, by compiling for their use his Nomenclator Classicus, and which was published the same year of their father's death. "It consisted of an accurate nomenclature, enriched especially with the correct meanings of both the Latin and Greek names of animals and plants, assigned to them by himself and Mr Willughby. It was highly serviceable not only to schoolboys, but to the amendment of the dictionaries and lexicons published after its appearance."* In the November of the same year in which Mr Willughby died, Mr Ray sustained another heavy affliction in the death of his friend, Bishop Wilkins. He now, therefore, sought consolation for his bereavements in domestic endearments, and married a young gentlewoman at that time a visiter at Middleton Hall, whose piety, discretion, and virtues, had recommended her to him as well as her agreeable person. Her name was Margaret, daughter of Mr John Oakly of Launton, a gentleman of a younger branch of a family of that name in Shropshire. They were married in Middleton church, June 5, 1673. Mrs Ray is said to have superintended the *English* part of the young gentlemen's education. Mr Ray was also engaged in preparing Mr Willughby's works, and some of his own, for publication, and in communicating papers to the Philosophical Transactions.

During the year 1674, and part of the next year, he was employed, as far as Mr Willughby's

* Derham's Life of Ray.

writings are concerned, in preparing his observations on birds, which made its first appearance in the year 1675, in Latin, in which language Mr Willughby had written it, as he did all his other manuscripts, it being at that time the catholic language of the literati of Europe.

It was published, in the first instance, as simply a treatise on ornithology, without those extraneous accompaniments which, as will be shewn, are entirely to be ascribed to Mr Ray's selection. It had the following title:—

Francisci Willoughbeii de Middleton armigeri e Reg: Soc: ornithologiæ Libri tres, in quibus aves omnes hactenus cognitæ, in Methodum naturis suis, convenientem redactæ, accuratè describuntur: descriptiones iconibus elegantissimis et vivarum avium simillimis ære incisis illustrantur. Totum opus recognovit, digessit, supplevit Joh. Raius.

It is now the place to give an account of this celebrated book. Dr Derham relates,* that when he "waited upon Mr Ray at Black-Notley, his native place, and whither he had retired to end his days, May the 15th, 1704, Mr Ray *told* him, that himself and Mr Willughby, finding the history of nature very imperfect, had agreed between themselves, before their travels beyond sea, to reduce the several tribes of things to a method, and to give accurate descriptions of the several species from a strict view of them; and forasmuch as Mr Willughby's

* Derham's Life of Ray, p. 48.

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genius lay chiefly to animals, therefore *he* undertook the *birds*, *beasts*, and *fishes*, and *insects*, as Mr Ray did the *vegetables*." This account Dr Derham professes to give as he had it from Mr Ray himself, a statement which Sir James Edward Smith could not have sufficiently weighed, when he pronounces, as he does in his introductory discourse to the Linnæan Society, p. 18, that "certainly it is by no means a fair statement of the case, to say, with Dr Derham, that Mr Willughby had taken the animal kingdom for his task, as Mr Ray had the vegetable one."

Dr Derham also remarks, "that Mr Willughby carried his province as far as the utmost application and diligence of a short life would enable him;" and that "he laboured so incessantly in his studies, that he allowed himself little or no time for those recreations and diversions which men of his estate and degree are apt to spend so much of their time in, but that he prosecuted his design with as great application as if he had had to get his bread thereby."*

Mr Ray's own account of the book is of great importance, as tending to set in a clear light the distinction between Mr Willughby's share in it and his own. "Observing," he says,† "in this busie and inquisitive age the history of animals to have been in a great measure neglected by Englishmen, (for that, since Turner and Mouffet,

* Derham's Life of Ray, p. 49.

† Preface to the English edition of Willughby's Ornithology.

none that I know of hath performed any thing therein worthy of commendation;) he (Mr Willughby) made the study thereof his *province*, applying himself with all diligence to the cultivating and illustrating it; which, that he might the more effectually do, he not only read what had been written by others, but did himself accurately describe all the animals he could find or procure either in England or beyond the seas, making a voyage to forein countries chiefly for that purpose, to search out, view, and describe the several varieties of nature; and though he was not long abroad, yet travelled he over a great part of France, Spain, Italy, and the Low Countries.

"In all which places he was so inquisitive and successful, that not many sorts of animals described by others escaped his diligence. For my part, I know no man who hath seen more species, been more exact in noting their differences, and *inventing characteristic marks*, whereby they may be certainly distinguished, or more curious in dissecting them, and observing the make and constitution of their parts, as well internal as external. The reason of this his diligence was, because he observed that some of the descriptions of former writers of this kind, either by reason of their brevity, or because they contained only general notes, were very obscure, and gave occasion to many errors and mistakes, but chiefly unnecessary multiplications of species, the readers often mistaking several descriptions of the same animals, which they met with in divers authors,

by reason of their generality and obscurity, for so many descriptions of different animals.

"Now, that he might clear up all these obscurities, and render the knowledge and distinction of species facile to all that should come after, he *bent his endeavours to find out* (as I before intimated) *certain characteristic notes* of each kind; but if, in any, no singular mark occurred, whereby it might certainly be distinguished from all others, he did minutely and exactly describe all its parts, that, at least, a collection of many accidents, which altogether could not be found in any species else of the same kind, might serve for a characteristic, that the reader should not, by a general and ambiguous description, be left in suspense, or incur the danger of error.

"But because prolix and operose description is tedious to most readers, and to the inattentive seems rather to obscure than illustrate the thing described, to relieve and gratify such, besides the description, he often adds some short notes, by which the animal described may be distinguished from others of the same kind like to it, and wherewith it is in danger to be confounded. Now, though I cannot but commend his diligence, yet I must confess that in describing the colours of each single feather, he seems to me to be too scrupulous and particular; partly, because nature doth not in all individuals (perhaps not in any two) observe exactly the same spots or strokes; partly, because it is very difficult so to word descriptions of this sort as to render them intel-

ligible, yet *dared I not to omit or alter any thing.*

"Viewing his MSS. after his death I found the several animals in *every* kind, both *birds*, and *beasts*, and *fishes*, and *insects*, digested into a *method of his own contriving*, but few of their *descriptions* or *histories* so *full* and *perfect* as *he intended them;* which he was so sensible of, that when I asked him upon his deathbed whether it was his pleasure they should be published, he answered, that he did not desire it, nor thought them so considerable as to deserve it, or somewhat to that purpose, though he confest there were some new and pretty observations on insects.

"But considering that the publication of them might conduce somewhat to, first, The illustration of God's glory by exciting men to take notice of and admire his infinite power and wisdom displaying themselves in the creation of so many species and animals; and secondly, To the assistance of those who addict themselves to this most pleasant and no less useful part of philosophy; and, thirdly, Also the honour of our nation in making it appear that no part of real knowledge is wholly balked and neglected by us, (he not contradicting,) I resolved to publish them, and first took in hand the Ornithology." Mr Ray proceeds to state, that "it was neither the author's nor his design to write pandects of birds, comprising whatever had before been written by others, whether true or fabulous; *that* having been performed already by Gesner and Aldrovandus, nor

to abridge their bulky volumes, such epitomes having been already made by *Johnston*. But our main design was to illustrate the history of birds, which is, (as we said before of animals in general) in many particulars, confused and obscure; by so accurately describing each kind, and observing their characteristic and distinctive notes, that the reader might be sure of our meaning, and upon comparing any bird with our description, not fail of discerning whether it be the bird described or no. Nor will it be difficult to find out any unknown bird that shall be offered; for comparing it with the tables first, the characteristic notes of the genuses, from the highest or first downwards, will easily guide him to the lowest genus; among the *species* whereof, being not many, by comparing it also with the several descriptions, the bird may soon be found. This, then, being our design, that we might surely effect it, we did not, as some before us have done, not only transcribe other men's descriptions, but we did ourselves carefully describe each bird from the view and inspection of it lying before us. Having acquainted the reader with our principal aim in this work, which was to give certain characteristic notes of the several kinds, accurately to describe each species, and to reduce all to their proper genera or classes, we omitted every thing not properly relating to Natural History.* Neither have we scraped

* "As hieroglyphics, emblems, morals, fables, presages, or ought also pertaining to Divinity,—as ethics, grammar, or any sort of humane learning."—RAY.

together whatever of this nature is any where extant, but have used choice and inserted only such particulars as ourselves can warrant upon our own knowledge and experience, or whereof we have assurance by the testimony of good authors or sufficient witnesses. Concerning the names of birds we did not much trouble ourselves, there having been disputing enough about them long ago; but have, for the most part, followed Gesner and Aldrovandus, being unwilling to disturb what is settled, or dispossess names that may, for their use, plead prescription; and because Mr Willughby (though sparing neither pains nor cost) could not procure, and consequently did not describe all sorts of birds;—to perfect the work, I have added the descriptions and histories of those that are wanting† out of Gesner, Aldrovandus, Bellonius, Marggravius, Clasius, Hernandez, Bontius, Wormius, and Piso, disposing each kind as near as I could in its proper place. Now, because elegant descriptions and accurate figures do much illustrate the understanding of descriptions, in order to the engraving figures for this work, Mr Willughby made a collection of as many pictures drawn in colors by the life as he could procure. First, He purchased of one Leonard Baltner, a fisherman of Strasburgh, a volume containing the pictures of all the water-fowl frequenting the *Rhene*, near that city, as also all the fish and water-insects found there,

† These articles are severally distinguished by an asterisk * throughout the work.

drawn with curiosity and exactness by an excellent hand, — the which, fowl, fishes, and insects, the said Baltner had himself taken and described at his own proper charges, and caused to be drawn. Secondly, at Nuremberg, in Germany, he bought a large volume of pictures of birds drawn in colors. Thirdly, he caused divers species, as well seen in England as beyond seas, to be drawn by good artists. Besides what he left, the deservedly famous Sir Thomas Brown, Professor of Physick in the city of Norwich, frankly communicated the draughts of several rare birds, with some brief notes and descriptions of them. Out of these, and the printed figures of Aldrovandus and Pet. Olina, an Italian author, we called out those we thought most natural and resembling the life for the gravers to imitate, adding also all but one or two of Marggravius's, and some out of Clasius his exotics, Piso his Natural History of the West Indies, and Bontius his of the East." Then follows a statement of the reason why "the sculps" were not so good as they might have been; namely, the distance of the editor from the press."*

* The plates were engraved at the expense of Mr Willughby's widow, and are better in the Latin edition than in the English, chiefly, however, in consequence of the superior nature of the ink used in the former edition. Both editions seem to have been made from the same plates. Still, even these, as contrasted with far less expensive representations of animals so abundant in the present day, shew the wonderful improvement made in

The Ornithology is divided into three books, which are each subdivided into chapters. The first book treats of Birds in general; the second of Land Fowl; the third of Water Fowl.

"The first book is divided into two parts. The first whereof contains birds of crooked beak and talons; the second, such whose bills and claws are more straight; the third book is tripartite. The first part takes in all birds that *wade* in the waters, or frequent watery places, but swim not. The second, such as are of a middle nature between swimmers and waders, or rather that partake of both kinds; some whereof are cloven-footed, and yet swim; others whole-footed, yet but very long-legged, like the waders. The third is of whole-footed or fin-toed birds, that swim in the water."

Acknowledgment is made by name to several "learned and worthy friends" who rendered considerable information and assistance.

A statement then follows of the particulars in which the English edition of the ornithology has been amended or enlarged. To which are added, three lengthy discourses of the art of fowling, with a description of several nets in two large copperplates; of the ordering of singing birds; and of falconry.

this department of art since the days of Mr Willughby. Yet it is doubtful whether the plates in the works of Hippolito Salviani, A.D. 1554, already referred to, might not bear comparison with the most successful productions of modern skill.

The treatise on ornithology itself would have had a much more philosophical aspect had it been published, as it may be certainly inferred the author would have chosen, without those unsightly discourses, and which give the book an unfortunate aspect to a modern reader, as too much resembling the old treatises on Natural History, which, with some valuable portions, are in general an accumulation of rubbish. Mr Ray has, however, taken upon himself the responsibility of adding the three discourses. In a letter from Dr Lister to Mr Ray, at Coleshill, in Warwickshire, dated February 8, 1675, he says, referring to the ornithology,—"I am very glad you say so much concerning the English edition, which you tell me you mean to augment. If I might advise you, in the history of hawks, it would be very acceptable to have their managery and training, which I find is done with much skill and faithfulness in a certain late piece called 'The Gentleman's Recreation,' printed in —74, where is the best account of hawks and hawking that I ever met with."

"Again, in the history of small birds, some account of the keeping and ordering of them in cages would please, which also is very well done, in a little book, entituled, "The Epitome of the Art of Industry," where you will find a large and very accurate tract of singing birds, both done by experienced and judicious persons in that way."

In another letter from Mr Ray to Dr Lister, dated June 14, —76, he says, "I have resolved

to follow your advice, in adding to the ornithology, an account of the ordering of birds for singing, also something of falconry, and besides, an epitome of the art of fowling. For this purpose, I sent for the books you minded me of about those subjects." These *discourses* will, perhaps, seem to most readers of the present day, as "german to the matter" of ornithology. as dissertations on cookery, tailoring, and dressmaking, would be at the end of a system of anatomy or physiology. Having given Mr Ray's account of the ornithology, and having distinguished Mr Willughby's share in its composition and merits, and also Mr Ray's, it seems now advisable to state the nature of its contents, as determined by subsequent writers, and to exhibit Mr Willughby's ornithological system as drawn out by one who is well qualified for such an undertaking. The portion, then, of the book which is really to be ascribed to Mr Willughby, "consists chiefly of dissertations on the form and external structure of birds, and their organization or internal structure, generation, age, shape, bigness, colour, natural instincts, manners, &c.

Then follow twenty-four queries, the answers to which, if founded on fact, and drawn up with judgment, would not fail to contribute greatly to the advancement of ornithology.

The author then institutes his leading distinctions derived from the form of the bill and feet, and would doubtless have accomplished a complete arrangement, had he uniformly adhered to

the same principle; but in compliance with the prejudices of his times, he assumes the different kinds of food, the varieties of the size, the nature of the flesh, and even what he calls the moral qualities, as the grounds of subdivisions. His second and third books contain a description and history of the species. To the exposition of each genus, are prefixed general observations, including the fabulous accounts of the ancients, and then such common properties as appertain to the genus.

He then proceeds to the specific details, stating the most important particulars with precision, and finishes with an account of particular habits."*

The following is Mr Willughby's system of ornithology.

Land Fowl.

Rapacious diurnal birds.
Rapacious nocturnal birds.
Crow kind.
Woodpecker kind.
Poultry kind.
Pigeon kind.

Thrush Kind.

Small birds with slender bills.
Small birds with thick and short bills.

* Rees's Cyclopædia, article Ornithology.

WATER FOWL

Cloven-footed, such as live about waters and marshes.
The greater kind.
Middle and lesser kinds, with very long bills.
2. With middle sized bills.
3. With short bills.

WATER FOWL *that swim.*

I. Cloven-footed, some of which may be called fin-toed, because they have lateral appendant membranes on each side of their toes.

II. Whole-footed birds.
1. Such as swim.
2. Such as have four toes, all webbed together.
3. Such as have four toes, but the hind one separate.
And first, such as have narrow and sharp pointed bills.
Such as have narrow, serrate, or toothed bills.
4. Such as have broad bills.
1. The grouse kind.
2. The duck kind."*

Now, with regard to this system, which, whatever may be its defects, is pronounced by the luminous writer of zoology, from whose work it is extracted, to be "the first rational attempt at

* Neville Wood's Ornothologist's Text-book, p. 100.

classification," it has of late years been questioned whether it is to be ascribed to the genius of Mr Willughby or Mr Ray; or to be considered, as it is also sometimes called, The System of Willughby and Ray. The doubt does not seem to have arisen upon any regular comparison of the evidence for each side; but the system is sometimes, in the most unhesitating manner, ascribed to Mr Ray, as if the point could not be controverted; or an opinion is past to that effect, without any appeal to proof; or the notion that it ought to be attributed to Mr Willughby is treated as a false impression, derived from Mr Ray's admiration and gratitude towards his friend, which led him to bestow honours on his youthful patron, which he might with more justice have assumed to himself; or at most, if the origination of the system is primarily traced to Mr Willughby, it is by representing it as having been on his part a sagacious but unformed conjecture; and that its present comparatively complete state is owing to Mr Ray's maturer knowledge, and protracted opportunity for observation. The writers expressing themselves in this contrary manner, agree at least in one point, that it is original with either Mr Ray or Mr Willughby, or both; no one having yet insinuated that it can be ascribed to any one else. It is plain that all reasoning on the subject can only proceed upon such evidence as actually exists, and can therefore be appealed to. So far from there being any thing in the shape of direct evidence

in favour of the opinion that Mr Ray is the author of the system, either wholly or partially, we have Mr Ray's own most positive statement, that when he came to look over Mr Willughby's MSS. he "found the several animals in every kind; both *birds*, *beasts*, *fishes*, and *insects*, *digested into a method of his own contriving.*" This statement is perfectly consistent with Dr Derham's account of his interview with Mr Ray, a few months only before his death; and in which Dr Derham, speaking "of the noble and useful design which by *agreement* between Mr Willughby and Mr Ray, fell to Mr Willughby's share, which was despatching the history of animals; of which design," he continues, "it may not be improper here to give some account, which I shall do, *as I had it from Mr Ray himself.*" He then proceeds to say, that "these two gentlemen, finding the history of nature very imperfect, had *agreed between themselves, before* their travels beyond seas, to reduce the several tribes of things to a method, and to give accurate descriptions of the several species from a strict view of them. And forasmuch as Mr Willughby's genius lay chiefly to *animals*, therefore he undertook the *birds*, *beasts*, *fishes*, and *insects*, as Mr Ray did the *vegetables.*" It is also perfectly consistent with Mr Ray's statement in the preface to the Ornithology, (the reader's impartiality will lead him to pardon the requotation of these passages, which is in this instance for a different purpose from the preceding,) that Mr Wil-

lughby, " observing in this busie and inquisitive age, the history of animals alone to have been in a great measure neglected by Englishmen, he made the study thereof *his province*, applying himself with all diligence to the cultivating and illustrating of it." After having given in the same preface an account of his amazing industry in the pursuit of his " design," he states, " I know of no man who hath *seen more species*, been more *exact in noting their differences*, and *inventing characteristic marks, whereby they may be certainly distinguished;* or more curious in dissecting them, and observing the make and constitution of their parts, as well internal as external." Again, he informs us that Mr Willughby " *bent his endeavours mainly to find out* (as I before intimated) *certain characteristic notes of each kind.*" These, with several other expressions which might be quoted from the same preface, shew that Mr Willughby's great object was the formation of a *system*, and the invention of one which might serve all the requisite purposes, not only in ornithology, but in the several other zoological departments. It is also observable that Mr Ray seems by no means unwilling to assume to himself all the credit due to him as the editor of his friend's writings; and to state fully and explicitly the various labours he was required to perform in that capacity. He states, without any apparent reluctance, that though " in viewing his MSS. after his death, he found the several animals in

every kind, both *birds*, *beasts*, *fishes*, and *insects*, digested into a method of his own contriving;" yet that, "but *few* of their *discriptions* and *histories*, so full and perfect as he intended them, and which he was so *sensible of*, that when I asked him upon his death-bed whether it was his pleasure they should be published, he answered that he did not desire it, nor thought them so considerable as to deserve it, or somewhat to that purpose." Nor is Mr Ray at all *sparing* in stating the reasons which induced him to resolve upon the publication of Mr Willughby's writings on natural history, "he not contradicting," and "first to take in hand the ornithology." He also *incidentally* calls Mr Willughby "the *author of this design* and *undertaking*." The same fact is recognized even in Mr Ray's epitaph on Mr Willughby. Dropping the plural style in which Mr Ray delights in most of his works to write, in reference to the assistance he obtained from his friends, he says, "But because Mr Willughby (though sparing neither pains nor cost) could not procure, and consequently did not describe all sorts of birds, to *perfect* the work, I have added the descriptions and histories of those that are wanting;" and then having mentioned the names of the several authors, out of which these were taken, he adds, "disposing each kind, as near as I could, in its proper place." He also speaks of the additions he made throughout the *whole* book, "as being so many that it would be tedious to enumerate them."

Upon the due consideration of these several circumstances, and upon consulting more extensively the preface to the English edition to the ornithology, the reader will be enabled to judge of the correctness of Dr Smith's assertion, who, in the same introductory discourse already quoted, says, p. 18, "Indeed, Ray was so *partial* to the fame of his departed friend, and has cherished his memory with such affectionate care, that we are in danger of attributing too much to Mr Willughby, and too little to himself;" and also of his still stronger statement in his life of Ray, in Rees's Cyclopedia, in which he says, "Even to his own prejudice he fulfilled the sacred duties of friendship, and delighted in adorning the bust of his friend with wreaths that he himself might justly have assumed."

It seems obvious that these suppositions involve for their truth a degree of weakness, both of intellect and feeling, or of sycophancy also, on the part of Ray, utterly inconsistent with his well known character. The powers of his mind were too great to admit of the conjecture that he *mistook* the distinction between his own merits and those of another; and, though his heart was eminently grateful, yet its emotions must ever have been too far regulated by the convictions of his understanding, to have betrayed him into so egregious and fruitless an error, as to have fallaciously transferred imaginary excellencies even to his most esteemed friend; while the suspicion of any interested motive cannot rest

for a moment on the character of one who, sooner than violate his conscience by the momentary act of signing his name to a declaration, chose rather to encounter the comparative poverty and dependence in which he lived and died.

So far from being influenced by worldly expectations from Mr Willughby's family, Mr Ray, at the time of the publication of the English edition of the Ornithology, had, as will shortly be stated, owing to domestic changes, removed from beneath their roof, and was no longer occupied in the superintendence of Mr Willughby's children.

On the whole, whatever praise may be due to Mr Ray's integrity and regard to religion as a man, public spirit as a member of society, fidelity and affection as a friend, (but for which qualities, Mr Willughby's principal writings might have lain neglected, and his real merit as the inventor of his systems have been more successfully questioned); yet his anxiety to disclaim honours to which he had no just pretensions, must be considered as one of the greatest beauties in his character, for unless the whole of the existing evidence attendant on the question be doubted, and which it cannot be unless at the expense of depreciating, in some respects, the character of some of the best and wisest of men, the judgment of a writer already quoted must be received, "that it is our duty to say, that the amiable and gentle Ray, whatever

he might be in *botany*, had very little merit as an ornithologist, the whole of the system, and also the names of the birds adopted throughout his work, being the production of his friend Willughby. This is frankly acknowledged by Ray himself, and, therefore, must be true. We are sorry to observe, that the credit of Willughby's system, and also of his names, is generally most unjustly awarded to Ray, in works on natural history in the present day."* The same writer thus expresses his opinion, as to the influence of Mr Willughby's Ornithology, in the researches of succeeding naturalists in the same branch of natural history,—"The system of Willughby is, without doubt, the basis on which the *ornithological classification* of Linnæus is founded; and it is a curious fact, that many of Willughby's genera, which were altered by the great Swede, are now again introduced merely as restricted by the former author."† And of Linnæus's *Systema Naturæ*, Mr Wood observes, that "it has probably done more to advance ornithology, than any other publication of a like nature."

The reader will excuse it if the narration here retrogrades for a short time to that point in which it last left the personal history of the good and faithful Ray, which is connected still farther with the memoir of Mr Willughby. He continued to reside at Middleton Hall till the end of the year 1676, when the old Lady Willughby,

* Neville Wood's Ornithologist's Text-book, p. 3, 4.
† Ibid. p. 3.

the mother of our naturalist, died. Mr Willughby's widow, soon afterwards, married the rich Turkey merchant, Sir Josiah Child, when his friend's children being removed from under his tuition, Mr Ray thought it best to leave Middleton Hall. He retired to Sutton Cofield, at the distance of about four miles, and continued there till Michaelmas, 1677, when he removed to Falborne Hall, not far from Black Notley, and afterwards, upon the death of his mother,* to Black Notley itself, where he passed the remaining twenty-five years of his life.

There are some instructions in Latin addressed by Mr Ray to his pupils; but whether written prospectively for their future use, or at a time when they were sufficiently acquainted with the language to understand them, is uncertain. They will be perused by every scholar with admiration for the beauty of the style, and by every good man for the excellence of the sentiments. They may be committed to memory, by the youthful reader especially, with advantage.† As soon as

* This event happened March 15, 1678. The following words are part of a memorandum respecting it, found among Mr Ray's papers, by Dr Derham, and transcribed into the life he wrote of him,—"I have good hope that her soul is received to the mercy of God, and her sins pardoned, through the merits and mediation of *Jesus Christ*, in whom she trusted, and whose servant she had been from her youth up, *sticking constantly to her profession, and never leaving the church in these times of giddiness and distraction.*"

† "Cum educationis vestræ cura a piæ memoriæ parente

Mr Ray became comfortably settled, he renewed his botanical researches, and, in the year 1682, published his own *Methodus Plantarum Nova*. In the year 1684, he sent to the press the His-

(amicorum optimo) mihi delegata sit, præcipuaque pensi mei pars in moribus vestris ad normam a patre præscriptam formandis versetur, officii mei esse duxi, quæ mihi in mandatis, dedit, *vobis* exponere; eàque, ut pro virili observare et implere annitamini obtestari: Ut virtutis, libertatis et moderationis, quamprimum per ætatem licet principia vobis instillem; literarum amorem et vehemens desiderium; laboris patientiam; otii, gulæ, libidinis, et omnigeni luxus odium, detestationem, fugam vobis suadeam et ingenerem.

"Hæc cum per absentiam non licet auribus *vestris* vivâ voce insonare, saltèm, quod possum, literis consignata *vobis* ob oculos ponere, et ut rerum perpetuo memores esse *velitis*, orare non desistam.

"Cum autem te ad libertatem provocem, cavendum est, ne vocem eam aliter interpreteris, quam oportet; et in sinistrum sensum detorqueas: — Liber ergo est, qui divinis mandatis obtemperat qui rationem ducem sequitur, qui pravorum affectuum jugum excussit, qui nec gulæ, nec libidini inservit, qui iræ, odio, et ambitioni dominatur; non qui, ut vult, vivit, nisi id velit, quod debeat, quodque rationi consentaneum sit; liber qui.

"Nullius addictus in verba jurare magistri"

aliena placita pro oraculis non habet, sed eorum dictata, ad Lydium rationis lapidem exigit, (de iis intellige qui per ætatem et usum judicio valent qui ingenio pollent:) liber denique, qui nec alienæ voluntati in tantum se emancipavit, ut ejus jussa sine delectu omnia, justane an injusta fuerint parum solicitus, exequi paratus sit legitimo tamen imperio in omnibus licitis, honestisque rebus promptè et libenter obsequitur.

tory of Fishes, under the title "Ichthyographia sive Historia Piscium, libri quatuor recognovit, cooptavit, et supplevit. J. Ray, Oxon, 1686; folio." A supplementum was added afterwards, dated, "Supplumentum; Lond. 1743; folio."

"Si hæc omnia observaveris, prout te observâsse spero et confido; quæ dixi, non parænesis sed encomium sunt; nec reprehensionis sed laudis materiam continent, teque sereno et tranquillo animo esse jubent, et rectè factorum conscientia lætari.—Siquidem

Qui monet, ut facias, quod jam facis, &c.

tantum ut quo cæpisti pede, pergas; et ut indies magis, magisque perficias consulendus est.

"Imprimis autem te vehementer exhortor, ut a malorum consortio abhorreas, nec iis unquam familiariùs utaris: memineris illius Apostoli

"Φθειρουσιν ηθη χρηστα ομιλιαι κακαι."

Verùm, si qui pii sunt, et probi, modesti, ingeniosi, docti, illos tibi socios asciscas, cum iis amicitiam colas, et libentissimè verseris, a quibus ipse aut doctior semper, aut melior possis discedere.

"Fastum omnem et superbiam exanimo ejicias: reputes tecum, quam stultum sit hoc vitium quam rationi contrarium, quam *Deo* et hominibus odiosum.

Summopere exorandus es, ut pietatem exerceas erga parentes, aliosque sanguine conjunctos quibus ætatis, dignitatis, aut gradûs respectu observantiam et reverentiam debes, ut eos debitis officiis colas eorumque monitis, consiliis, imo et reprehensionibus justis auscultes et obtemperes. Tandèm ut grato animo esse velis erga omnes, qui de te bene meruerint:—decorum, honestum, justum est, ut eos, qui te amore et benevolentia prosequuntur, qui fideli consilio aut precibus apud Deum juverunt, qui beneficiis cumulârunt, ut eos, inquam, vicissim diligas, et

In a letter to Dr Tancred Robinson, dated February 18, 1684, Mr Ray tells him that he had extracted out of Mr Willughby's papers, revised, supplied, methodized, and fitted for the press, the Ichthyologia. Dr Tancred Robinson communicated it to the Royal Society; and the members of that learned body, thinking that so good a work was worthy of being published, "did, by the help of Bishop Fell, get it printed at the Theatre at Oxford, the Royal Society bearing the charge, and the cuts being engraved at the cost of divers worthy members of that learned body. The reason why none of Mr Willughby's family afforded pecuniary assistance towards this work as to the former, may have been, that the widow of Mr Willughby was now married to Sir Josiah Child, and that both his sons were still very young. This book, although fewer materials were left for it than for the Ornithology, owing partly no doubt to the loss of Mr Willughby's papers, containing his observations on fishes, while abroad, is also frequently included by Mr Ray as *one* amongst those *several kinds of creatures, birds, beasts,*

affectu mutuo complectaris; ut paria facere contendas; imo ut cum favore beneficium reponas, et agros fertiles imiteris, qui multo plus reddunt quam acceperunt.

"Hæc sunt, quæ tibi consulere officii mei esse duxi, ut ingrati, imo injusti notam effugiam; 'ut qui beneficium acciperem, officium autem non præstarem ullam'—quæ ut eodem, quo a me animo profecta sunt, accipias; eademque non ut monita mea, sed ut mandata paterna, imo divina respicias, et observes, rogo; meque habeas, pro humilissimo et fidissimo tuo cliente et servo."—J. R.

fishes, and insects, which he had digested into a method of his own contriving, yet also leaving few of their descriptions and histories so full and perfect as he intended them." Mr Willughby is known to have considered Belon as the best writer on ichthyology whose works were extant in his day. Their systems are said to have some resemblance, but not to the extent of depriving Mr Willughby's of a claim to invention.

The following years of Mr Ray's life were occupied in the publication, at different intervals, of several excellent works, none of which, however, were in any way connected with Mr Willughby.

In the last year of his life he resolved to complete Mr Willughby's History of Insects. In a letter to Dr Derham, who had just been to visit him, dated August 16, 1704, he writes, "It is high time that I give you thanks for the kind visit you made me here, and those rare insects you were pleased to communicate. I am now entering on a History of Insects, &c. The main reason which induces me to undertake it is, because I have Mr Willughby's history and papers in my hands, who had spent a great deal of time, and bestowed much pains upon this subject, when there were few that minded or were diligent about it, though now there are many; and it is a pity his pains should be lost."

In the last letter * Mr Ray wrote to Dr Derham,

* Philosophical Letters, p. 342.

dated September 6, 1704, he says,—"The work which I have now entered upon is indeed too great a task for me; I am very crazy and infirm, and God knows whether I shall overlive this winter. Cold weather is very grievous to me; besides, I have not bestowed sufficient time and pains in the quest of any insect tribes, except papilios; and I have told how far short I am of perfection in that. I rely chiefly on *Mr Willughby's discoveries* and the contributions of friends; *as for my own papers on this subject, they are not worth preserving.*" Mr Ray died on the 17th of January in the next year, 1705.

The History of Insects was published after his death by Dr Derham at the expense of the Royal Society, in the year 1710, under the following title:—

"Historia Insectorum, Autore Joanne Raio; Collegii S. Trinitatis apud Cantabrigienses, et Societates Regiæ olim socio, opus posthumum. Jussu Regiæ Societatis Londinensis Editum.

"Cui subjungitur appendix de scarabœis Britannicis Autore M. Lister, S.R.S. ex MSS: Musæi Ashmolæani."

This work comprehends all Mr Willughby's descriptions, with others by Mr Ray, and forms a quarto volume, including the appendix on British beetles. It abounds with acknowledgments to Mr Willughby throughout, made frequently in terms of the highest respect and deference. When it is considered how comparatively neglected the study of insects was when Mr Willughby began,

the system contained in this volume, and the descriptions which are acknowledged as his by name, might have of themselves been considered a very sufficient and praiseworthy occupation of his short life.

Various testimonies of that age are still extant of the public estimation in which Mr Willughby was held; one of these, consisting of a comparison between him and Dr Wilkins, may be admitted, taken from Echard's History of England.*

" After all these, we shall mention Francis Willughby, Esq. of Middleton in Warwickshire, one highly celebrated among the great virtuosi of Europe. He was descended from two great branches of that ancient and most famous family of the Willughbies, and proved a mighty ornament to them both. His rare natural abilities, joined with his indefatigable industry, brought him to very great skill in all parts of learning, and particularly in those sciences which are most abstruse and uncommon to vulgar capacities; the most subtle parts of mathematics and natural philosophy; and more particularly the history of animals, birds, beasts, fishes, and insects, in which he distinguished himself almost beyond example, and became the glory of his age. In order to which he travelled into many countries, and left no impediment untried; and last of all, he was snatched away in the 37th year of his age, to the great concern of all curious and inquisitive

* Edition folio, 1718, vol. iii. p. 309.

scholars, especially of the Royal Society, and the great loss of all good men who were acquainted with his virtues, and of all learned men who could judge of his labours.

" The other, Bishop Wilkins, was a person of a different temper, and a more extensive genius; who was no loser, but a considerable gainer in the late troublesome times. He was educated in the University of Oxford, where he was warden of Wadham College, and thence removed to the mastership of Trinity College, Cambridge, by Cromwell, whose sister he had married.

" He was deprived of this at the Restoration, yet afterwards, for his admirable abilities, he was made Bishop of Chester; and surely the Court could never have found a man of greater ingenuity and capacity; or of more considerable knowledge and understanding, being distinguished not only by his theology and his excellent preaching, but for his skill in mathematics, in philosophy, and in all sorts of polite and valuable learning, than whom no man ever had a truer taste or a more solid judgment."

The marble busts of Mr Willughby and Mr Ray stand opposite to each other in the Library of Trinity College, Cambridge, at the commencement of that long succession of resemblances on either hand of the great and wise of past ages, which deepens the veneration inspired in the visiter by the view of their works, assembled around him, and who occasionally pauses to compare the " features with the thoughts" of those of

them whose history is peculiarly hallowed in his recollections.*

In reviewing the short but brilliant career of Mr Willughby, our observations must be directed to his merits viewed in relation to his advantages. He seems to have been possessed of every pre-requisite for great scientific attainments; being an instance of the rare union of intellectual powers of the highest order, a sound constitution of body, and a natural inclination for exalted pursuits. Had any one of these endowments been wanting, or possessed by him in a lower degree, his character might have been less admirable. An inequality of the mental powers might have made him merely a well-meaning and virtuous man,—qualities, indeed, whose absence cannot be compensated by the possession of *any* others, but which would not have raised him to the position of eminence and usefulness which he occupied. Still less valuable and illustrious might have been the results, had not every other qualification been directed by an excellence of disposition. It need not here be attempted to assign the causes of that violent propensity to evil which has often been associated with great talents, and which, if indulged, has

* And if a sage's bust arrests thee, there,
Pause, and his features with his thoughts compare.
ROGERS' *Pleasures of Memory.*

"Dryden drew inspiration from the 'majestic face' of Shakespeare, and a portrait of Newton was the only ornament of the closet of Buffon."—*Notes.*

served but to render those talents the means of proportionably greater mischief and misery, and every worldly advantage the source of self-degradation to the possessor, involving too frequently that of others also; or which propensity, if restrained, requires that concentration of intellect upon the mere effort of preserving a decent regularity which almost entirely absorbs its energies. Mr Willughby, though doubtless sharing in the general frailty of mankind, seems to have suffered no diminution of his usefulness from any lapses or aberrations of good principle, or from the corroding regrets by which these are retrieved. Still this right direction of his powers was, no doubt, an act of voluntary selection, on his own part, to the extent needful to have rendered it virtuous,—a selection which, in order to its being praiseworthy, must have been made upon an acquaintance with the difference of those objects which compete for human preference. There is reason also to believe that he owed much to the instructions, example, and assistance of his parents, who were themselves highly educated, and truly excellent persons; capable not only of conducting the earlier part of his education upon the best principles, but also of appreciating the bias of his natural disposition, and of adopting right means for its development. There is, however, one portion of Mr Willughby's character, the praise of which must be, partly at least, ascribed to himself, which was, his abhorrence of idleness, which he justly considered as the parent of almost every

vice. May persons of every class in society be constantly actuated by a similar persuasion, and dread the first hour that shall find them unengaged in some interesting and useful pursuit, as most certainly exposing them to the seductions of self-indulgence in animal pleasures; whose syren voice, unless guarded against with the forethought and decision of the prince of Ithaca, may disable its captive listener from refusal or retreat, and involve him in a destruction more calamitous than that which strewed, with bones and corruption, the rocks and caverns of Pelorus! He had happily become convinced, that the only method whereby the mind can be preserved free from the solicitations of inordinate desires, and be kept both innocent and cheerful, is to occupy it with those pursuits which are conducive to a course of virtue and usefulness.

The excellence of his choice will become more apparent, if it be considered to what powerful temptations he must have been exposed from station and affluence; temptations increased in number and force by the state of his times, which offered him the excitement of political partisanship, or those coarse and dissolute pleasures to which persons of his position in society were then too generally addicted.

It should also be remembered, that the departments to which he devoted his time and energies, were then, comparatively, unexplored, and so new was one of them to the world generally, namely, the study of insects, that even at the

distance of some years after the death of Mr Willughby, an attempt was made to set aside the will of a Lady Glanville, on the ground of lunacy, because she had shewn a strong partiality for insects; and Mr Ray had to appear on the day of trial, to bear testimony to her sanity!* Nor were there those inducements of an honorary description then, as now; the Royal Society had not even existed as such, till some years after Mr Willughby had addicted himself to his favourite studies.

Another excellence of character which he exhibited in the highest perfection, was his due estimate of birth, fortune, and talent,—" not contenting himself therewith, or valuing himself on them, but labouring after what might render him more deservedly honourable and more truly to be called his own, as being obtained by the concurrence at least of his own endeavours." With respect to birth,—a distinction which, like some others, is despised chiefly by those who do not possess it,—if it be a fact, that the consciousness in an individual of being able to trace distinctly his origin through a long succession of persons chiefly distinguished by the rewards of merit, or the due performance of those duties which the inferior grades of society expect from privileged station, is really a motive felt by him who forms the existing member in the series of illustrious descent, inclining him to avoid whatever is mean in conduct, and to pursue whatever is

* Life of Ray in the Naturalist's Library.

honourable and kind towards his less distinguished neighbours, as the fee-simple of that station, and of which he is "seized and his heirs for ever;" then will no wisely-judging wellwisher of society desire to see this distinction annihilated, since every motive to good conduct, like every thread in the cable, is valuable as conducive to the general result. If ever any man had temptations to the pride of birth, it was Mr Willughby, the authentic and unbroken records of whose family carry his descent, by his grandfather's side, up to the Conquest, through a succession scarcely ever descending, for any great length of time, beneath the level of nobility, and including in its progress alliances with the chief sovereigns of Europe. But Mr Willughby was aware, that, as far as concerned himself, this was an accidental distinction, that he derived no worthiness from the virtues of his ancestors, and that, as ever he would support the hereditary honours of his family, and avoid those honours becoming a reproach to himself, he must "labour after what might render him more deservedly honourable, and more truly to be called his own, as being obtained by the concurrence at least of his own endeavours." His estimate of the advantages of fortune were equally just. He must have experienced the value of competency, as affording scope and efficiency to genius, by enabling its possessor to obtain, in the first instance, the best kind of education, and ever afterwards to remove all impediments to his researches.

There are, no doubt, many brilliant instances on record of genius contending with difficulties, and emerging from amid them; and these instances sometimes command the admiration of mankind, just as they admire the splendours of the sun when, having gained the meridian, his beams gild with effulgence the clouds which enveloped his rising; but it is to be questioned whether their admiration of these instances does not largely partake of the quality of mere surprise, or of beholding a difficulty overcome; and whether the objects of it, having attained that given point they appear to have proposed to themselves, have not afterwards sunk into a comparative lethargy, consisting at best in the satisfaction of having gained a purpose, and quite as often at least in the exhaustion of the energy their attempt required. It must be confessed, that of two competitors in the pursuit of science, under equal circumstances, in other respects, he has infinitely the advantage who is free from the paralyzing effect of worldly cares; and that, though the weight of early difficulties on the principle of genius, creates a reaction of its powers favourable to success, yet, unless it be speedily relieved by gaining some vantage ground upon which it may recruit its powers, *that very reaction* may merely result in disheartening and disabling from farther enterprise. The cause of science seems to have peculiar claims upon those who are possessed of the requisite worldly advantages, and have imbibed a taste for its pursuits, either to engage in them personally, or at least

to assist others to climb the steepy ascent to usefulness, unencumbered, who otherwise might have "waged with fortune an eternal war."*

The annals of science are indeed replenished with the names of many persons of this class in society, who have acknowledged and acted on the duty arising from the possession of wealth, in one at least, and often, like Mr Willughby, in both of the modes now adverted to. It were to be wished that Mr Ray's intention, partly, at least, in editing the works of Mr Willughby, and writing his life, may be more extensively accomplished; which, next to doing him right, by procuring him the honour due to his memory, was "to provoke young gentlemen of this nation, by the proposal of so illustrious an example of their own rank, to prosecute the study of ingenious literature, and to aspire to true honour by the constant exercise of virtue."† It is also equally

* Beattie's Minstrel.

† It may be allowed to record an instance in which such an effect was produced. It is that of the naturalist Pennant, born 1726, who, like Mr Willughby, was of illustrious descent, and whose father was a wealthy old English gentleman. He tells us that "a present of the Ornithology of Francis Willughby, made to me when I was about twelve years of age, by my kinsman, the late John Salisbury, Esq. first gave me a taste for that study, and incidentally a love for that of Natural History in general, which I have since pursued with my constitutional ardour." Speaking of his Arctic Zoology, he says, "This work was begun a great many years past, when the empire of Great Britain was entire, and possessed the

worthy of remark, that the subject of our memoir did not rest contented in the mere consciousness of talent. On the contrary, he seems to have been early aware, that the value of ability of any kind consists in its due and proper application, so that "he addicted himself to that department of Natural History, which, by agreement with Mr Ray, he had selected, as diligently as if he had been compelled to get his bread by it."

As may be expected from the foregoing account, he was most deeply sensible of the value of time,

northern part of the New World with envied splendour. At that period, I formed a design of collecting materials for a partial history of its animals; and with true pains, my various correspondents made far greater progress in my plan, than my most sanguine expectations had framed. Above a century ago, an illustrious predecessor in the line of Natural History, who as greatly exceeded me in abilities, as he did in zeal, meditated a voyage to the New World for a similar purpose. The gentleman alluded to was Francis Willughby, Esq. who died in 1672, on the point of putting his design into execution. Emulous of so illustrious an example, I took up the object of his pursuit, but my many relative duties forbade me from carrying it the length of that great and good man."—*Memoir of Pennant in the Naturalist's Library*, page 32 and 33.

It seems that Mr Pennant did not, however, follow his exemplar with equal steps. It is remarked by Mr Swainson, that he "followed the system of Linnæus, except in that strange and unnatural system of the primary orders of birds which he fell into, and which was the more inexcusable after the writings of Willughby."—*Preliminary Discourse*, page 50.

or, in the words of Mr Ray, " he did not willingly let slip one moment of it unemployed." He had not, therefore, yielded to the delusion, that talent is a compensation for every other deficiency; and that it especially exempts the possessor from the industry which is sometimes spoken of as more appropriate to less gifted individuals. It had, however, been well for those who hold this erroneous notion had they understood, that talent, without the knowledge to be acquired by application, is mere power without skill; and that there are strong reasons for believing, that what is called genius consists greatly in the aptitude for patient attention. But there were other component qualities in the character of Mr Willughby, of equal value with any of the preceding,—namely, his entire dominion over the carnal propensities of his nature, the indulgence of which has ever been most justly reckoned as the most deadly foe to greatness. Hence, his time was not devoured by the long intervals which even occasional excesses demand from their commencement to the cessation of their effects, nor his faculties beclouded and weakened by the sympathy of his mind with a disordered body, nor his moral feelings perverted by the grossness which is transferred to them from the pampered appetites of the voluptuary; but his understanding and heart were ever replete with the tranquillity, purity, and brightness of the early summer's morning, rendering every perception correct, every emotion just, every purpose exalted.

And, it may readily be believed, that such a state, instead of being one continual pain, as it appears to the weakened and perverted judgment of the sensualist, is, on the contrary, the highest state of human enjoyment. Mortification is merely the *process* by which it is at first obtained, and which, thenceforward, entirely ceases, leaving results which convince the happy possessor, that "the minding of" the intellect is life and peace.

Nor was Mr Willughby so absorbed in his philosophical pursuits, as to be neglectful of the interests of his family, and the improvement of his estates. There are two avenues of noble oaks at Wollaton, which were planted, or, as it is worded in the family records, "sown" by him.*

There are many fine oaks at Middleton also, which he is said to have planted. Were it needed, it might be shewn, by much additional evidence, that he knew how to combine the requisite attention to his worldly concerns with the most devoted pursuit of science, evincing his own superiority to the weakness of considering, as some have done, or rather perhaps have affected to do, that such objects of attention are incompatible with each other. No distinct account exists of

* The use of the particular word "sown," as applied to these avenues, reminds of Evelyn's Silva, which was published in the year 1664, and in which he recommends that oaks should be "sown," in order to preserve the tap-root which is often destroyed by transplanting.

his particular religious principles; perhaps the state of the times was unfavourable to any marked expression of these. It is not the least evil resulting from such a political condition as existed during the Commonwealth and subsequent Restoration, that the wise and good are often compelled by it to decline the well-timed and moderate avowal of the distinguishing doctrines of Christianity, in order to avoid the imputation of indifference from the extravagant zealot on the one hand, and the charge of religious hypocrisy from the profane, rendered still more profane by the spirit of revulsion on the other.

But enough is still said of him to justify the most pleasing conclusions. His habits of industry, temperance, and purity—his enlightened estimate of the advantages of birth, wealth, and intellectual ability, and of the true nature of personal worthiness—his abhorrence of idleness, on the ground of its being the parent of almost every vice—his eminent virtue and goodness—his remarkable humility, justice, and integrity—his disinterested constancy to his friends—his comprehensive "charity toward all *good* men, to the exclusion, however, of such opinions as are inconsistent with true goodness"—his fear and reverence of the Deity, deep sense of his goodness, and thankfulness for the same—sincere piety in all his actions toward him, and great abhorrency of whatever tended to his dishonour—his patience and submission, which he also evinced so conspicuously on his deathbed,—all which qualities

are in almost the same words ascribed to him by the pious and impartial Ray, and also in the most solemn manner reiterated in the affecting *prayer* which he composed on the subject of his death, fully justify the belief that religion was the great actuating principle of his pursuits, transforming them into a course of devoted services to the Creator. Nor need it be distrusted that, upon these varied excellencies, was ingrafted a belief in the genuine doctrines of Christianity; since dispositions of this kind constitute "the honest and good heart," in which Christianity produces its most fertile and valuable results, agreeably to that ever memorable declaration of its Founder, that "if any man will *do* the *will* of God, he shall know of the *doctrine* whether it be of God." The writer would express his conviction, derived from the acquaintance with Mr Willughby's character which has necessarily arisen during the research required by this memoir, that his religious principles did not rest in a mere general and indefinite acquiescence in the articles of the Christian faith, but in that clear and heartfelt apprehension — that predominant influence of them—which is supposed throughout the formularies of the Church of England to be possessed by its members, and which those formularies are so admirably calculated to excite and cherish. The concluding observation with regard to Mr Willughby, is, that his eminence as a naturalist may, no doubt, be greatly ascribed to the basis which was laid for it in the sound edu-

cation in classical and mathematical learning in the first part of his life. His early proficiency in these may be inferred from his ready use of the Latin language, in which all his papers were written, and from his correspondence with Dr Barrow on mathematical subjects, which took place when he was only twenty-seven years of age. To the habits of correct reasoning, minute, and universal observation, extensive acquaintance with nature, and scientific truth thus acquired, may be ascribed that excellence in the great variety of departments which he attained even before the powers of his mind had reached their maturity. The mental habits derived from the exclusive study of classics and mathematics during a considerable period in the first part of education, render accurate and extensive acquirements in any department to which the attention may afterwards be turned both sure and easy, while, for the want of this early training, the best wishes and most desirable advantages are often rendered useless. It may serve to abate the impatience of some youthful students, who, amid the fatigues of learning languages, and of pursuing what, in ancient phraseology, were most happily called "the exact sciences," may sigh for what they deem the more congenial pursuits of Natural History, to assure them, that till they are possessed of the *mental discipline* to be derived from their appointed studies alone, attention to Zoology, or to any other branch of natural philosophy, would but dissipate their energies already acquired, and

by so much as they might indulge it, diminish their power of pursuing hereafter the study of any department of nature with success.

Let them, therefore, postpone the gratification of their wishes as ever they would avoid being numbered with that large class of individuals who, by having had their attention too soon directed to such branches of knowledge, have ultimately attained scarcely a mediocrity in any.

It may also be permitted to remark on the collateral advantages of a moral and religious nature which result to the individual himself, who, with the requisite education, pursues Natural History either as his chief occupation, or for purposes of mere amusement or relaxation. The attention of the naturalist is directed to the immediate works of Deity, which are the realized perceptions of whatever seems beautiful and wise to His infinite intelligence. These pursuits also lead him to the continual observation of the specimens of *design* apparent in the works of nature, and which are the primary proofs of the existence and attributes of God.*

* The utility of Natural History in this respect has been so extensive, that owing to the advancement it has made within comparatively a short space of time, such a phenomenon as an avowed speculative atheist which not unfrequently presented itself to our forefathers, is now almost unknown. The reader acquainted with Paley's Natural Theology will be aware to what excellent effect the different departments of physical science are there applied. The service it has rendered to religion is one of the highest recommendations of Natural History, and which, presented

These studies also peculiarly prepare the mind for the due reception of revealed religion, between which and natural religion many striking analogies exist, as might be expected in two systems, each of which equally originated in the same eternal mind, and of which it may yet farther be asserted, that the natural world is the material type and representative of the spiritual, —the former being intended to assist our comprehension of the latter.* The displays of the divine benevolence which constantly present themselves to the view of the student of nature, tend to refine and soften his own feelings, since he will soon perceive the abundant provisions made by the Creator for the happiness of every sensitive being, whose happiness therefore is His will, and which man may not needlessly diminish, but at the peril of frustrating the intention of God; nor less effectually do they conduce to that genuine humility which is so favourable to every virtue. The observer of nature must be frequently reminded that he is but one out of a myriad of sensitive beings who are all equally with himself the production of the divine wisdom and benevolence, and thus become dispossessed

in the form of books, conveys its most valuable benefits to many who would otherwise be precluded from enjoying its highest advantages.

* Romans, i. 20. The same idea is thus expressed by Milton in the fifth book of the Paradise Lost:—

What, if earth be but the shadow of heaven,
And things therein, each to each other like,
More than on earth is thought.

of that pride and indifference to any living creature which has its origin in the neglect or inattention of this obvious truth. Nor among the advantages of the study of natural history should be overlooked its continual effect in keeping those habits of correct reasoning, in constant vigour, upon which the wellbeing and improvement of mankind so much depend. It requires, at every time, the same devoted love of truth, and the same union of hardihood and humility in the pursuit of it; the most accurate habits of observation, the most entire exemption from prejudice, the most unwearied perseverance. It is impossible, that the constant exercise of these habits and states of mind, should not gradually originate numerous others, nearly or more remotely allied to them, and exercising their influence in the most desirable manner on all the varied interests of the possessor.

Nor is it unimportant to remark, that a taste for natural history supplies the individual with resources of innocent, improving, yet inexhaustible amusement wherever he may be situated. It is especially the great secret of relieving the monotony and tedium of a country life. The intelligent father, too, may employ his children as his collectors, and imbue their minds, at the most desirable period, with what is of inestimable value,—the love of nature. It affords an amusement which is also highly conducive to health, and all its incalculable blessings; it being a well-known fact, that naturalists are remarkable

as a class of men for their longevity. It may be pursued as a study or an amusement, at a very small expense; it is unlimited in its resources, and so calculated to improve the moral character, that it is asserted by an eminent writer, that less evil has been chargeable, in proportion, upon the naturalists, than upon any other order of students.

In addition to these advantages, the examination of nature tends peculiarly to produce and establish a serene and happy state of mind. It is hardly possible to read the lives of naturalists without making the reflection, how considerable a share of happiness they must have enjoyed. They have been compared, in this respect, to the father of mankind yet unfallen, when engaged in the happy garden in giving names to the cattle, fowls of the air, and beasts of the field. How silent, how peaceful, must have been the meditations of these priests of nature—how pure, how healthy their perceptions — how free, how full of joy the action of their intellect — when communing with the denizens of air, and earth, and ocean!

What superiority to the envies of courts, and the tumults of camps and senates, and even the competitions of the dull distant city, which they have descried in their far off wanderings, and whose fumes and blackness are but the too exact emblems of their agitations and crimes!

Nor may it be forgotten that the pursuits of the naturalist are peculiarly calculated to remind him of the clearest natural argument for his own

immortality—which is derived from the fact, that whereas every other sensitive being is in some degree essential to the happiness of some other earthly beings, man only stands alone in this respect, since every other tribe of being would continue equally happy did mankind universally cease to exist. What may he not expect from this obvious phenomenon, but that he is the last apparent link in the chain of earthly being, ready to be removed without any disturbance to the order and welfare of nature, but also most probably having relations to other classes of beings superior to himself in other scenes of existence. Nor will the presumption appear to him totally unfounded, that when removed thither, the works of God will still continue to be the objects of his attention, and that the knowledge he is now acquiring may prepare him to enter hereafter upon a proportionably higher position of dignity and enjoyment.*

* Those readers who are yet unacquainted with Mr Swainson's Discourse on the Study of Natural History, edited in Dr Lardner's Cabinet Cyclopædia, may there find these and other inducements to such pursuits drawn out and exemplified in the most admirable manner. It is hoped that the acknowledgments already made by the writer of this Memoir will be deemed sufficient. To himself it seems no less a privilege than a duty to confess his obligations to so excellent a writer.

THE

NATURAL HISTORY

OF THE

NECTARINIADÆ OR SUN-BIRDS.

INTRODUCTION.

" Each spangled back bright sprinkled specks adorn,
Each plume imbibes the rosy-tinctured morn;
Spread on each wing the florid seasons glow,
Shaded and verged with the celestial bow;
Where colours blend an ever-varying dye,
And wanton in their gay exchanges vie."

In the early Volumes of " The Library," we have endeavoured to illustrate a family of birds, universally acknowledged to be among the most brilliant in plumage, as well as being most interesting and singular from their diminutive size; these were seen to be peculiar to the New World, and more particularly to the tropical or warmer portions of it, though a few examples of tiny size and bright colouring extended far to the north*, appearing there as

* Selasphorus rufus, Sw.

gems among their generally dull plumaged companions. But according to the theory and principles of representation, which have been of late so much, and, we may say, successfully insisted on in our various works devoted to Zoology, it was to be expected that some portions of the Old World, and more particularly those under the tropics, would present forms bearing a close alliance in their habits, and exhibiting some of the resplendent colouring which so conspicuously marked the plumage of the Humming-birds. And these expectations, commenced by theory as a general law, have been verified in this instance by facts, for the continents of Asia and Africa are the strongholds of another race of fairy birds which vie with the Trochilidæ in brilliancy; and though they differ in many of the essential parts of their structure, they still agree by holding the same place in the ornithological economy of the countries they inhabit.

The "SUN-BIRDS," deriving their appellation from their brightly-tinted dress, appearing in higher splendour when played on by the sun-beams, may be said to be peculiarly restricted to the tropics of Asia and Africa; but when we take the form as a family, we shall find it extending far beyond that range, and reaching on the one hand to the numerous islands in the Pacific Ocean, while in another direction a few members occur in South America and the adjacent islands, in both instances forming the exception in the amount of numbers; the form

in the first being the one peculiarly taken up by the Meliphagidæ or Honey-suckers, in the latter by numerous and abundant species of Humming-birds.

When we commenced to work at the present Volume, we had intended to include the whole groups of the family, giving a general survey of the forms, and illustrating them by figures of the more typical examples only; upon entering on the subject, however, we found that there were ample materials to furnish sixty or seventy interesting illustrations, instead of about thirty, to which in the other case we should have had to restrict the whole; and on this account we have decided to confine it to the typical form alone, or the genus Nectarinia* of Illiger, by which we shall be enabled to give nearly a monograph of the species, with figures of a large proportion of them. The remaining forms may be hereafter again taken up and illustrated; nevertheless, some general observations may be now required.

The Humming-birds, or family of the Trochilidæ, although they want the wide gape and other accessaries around the mouth provisional for capturing insects in flight, in form most closely resemble the fissirostral genera, being deficient in the members particularly adapted for perching, while they possess an extraordinary development of those proper for flight. The want of adaptation, however, in

* *Nectarinia* was applied by Illiger in 1811; *Cinnyris*, by Cuvier, in 1816 or 1817.

other members, prevents the wings being used to pursue an insect prey, though their great development is as necessary to the manner in which they feed, by hovering above the beautiful blossoms which afford a sustenance, in part, alike to them and to a host of minute insects; and also to perform the lengthened migrations which these species are known to undertake annually. In the Sun-birds, or Nectariniadæ, the family which we have now to examine, we see no such extraordinary development of wing, and their legs and feet, or, in other words, their provisions for perching, are equal to those of the majority of the Incessores, and show at once a marked difference between the structure of the same parts in truly fissirostral birds, where they are always extremely weak, comparatively unfitted for perching or settling on the ground; and where, in fact, they are constructed upon that model which will be least incommodious to the bird in pursuing its prey with rapidity through the air, or in performing very long migrations. The nectariferous juices of flowers have also been considered as the chief food of the Sun-birds, at least during certain seasons of the year; but we find the manner of seeking for these to be very different from the hovering flight of the Humming-birds,* the Nectariniadæ always perching first, and exhibiting

* Mr. Jerdon states of the purple Sun-bird (*C. Malrattensis*, Jerd.), "That it occasionally hovers on the wing before a flower, while extracting the honey, but generally hops or flies rather among the smaller twigs. It feeds partly on the honey ex-

more similarity in passing from blossom to blossom, to the activity of some of our small warblers, rapidly examining the flowers of one plant and immediately passing off to another, uttering, during the while, a shrill and impatient call. Neither do the species perform extensive migrations, at least, where a continued flight has to be maintained. In the Old World the change of station is chiefly from the town and coast districts to the more exalted regions, where it is possible a succession of food may be acquired; or if the range is more extensive, it is performed over tracts, or coast-wise, where resting-places may be found during its continuance. In both groups the bill and the tongue are inserted into the tubes, and withdraw from them the honey and the small insects which are attracted by it. In both the mechanism of the tongue is in different manners adapted for this mode of deriving nourishment, and in both are the members of the family extremely numerous, social in their habits, and probably intended, in their respective countries, as one of the means by which the sexes of many plants are introduced to each other. Thus it is that we see design in every part of the plan of Nature, and even its frailest creatures dressed in a garb of splendour, and, agreeable to all external senses, also made the instruments, in a manner most simple, at the same time essential to their own existence, of carrying on

tracted from flowers, and partly on minute insects, flies, cicadariæ, &c. Occasionally I have seen it snap at an insect in the air." Jerdon's Cat., Madras Journ., 1839, *et seq.*

and perfecting one of the most important properties of vegetation.*

The *Nectariniadæ*, or *Sun-birds*, are placed by Mr. Swainson as the sub-typical family of the Tenuirostres or suctorial and slender-billed birds, of which the True Humming-birds stand as the most developed form. The five genera which the same gentleman has taken to represent the principle modifications of structure (1. *Melithreptus*, 2. *Nectarinia*, 3. *Anthreptes*, 4. *Cœreba*, 5. *Diceum*) nearly show also their geographic distribution. The second or typical form is confined nearly to the tropics of the Old World, there holding the same rank in distribution as the more perfect Trochilidæ. The first is confined to the islands of the Pacific Ocean, exhibiting a variety of the form there; while the fourth, extremely limited in species, another family entirely almost occupying its place, is proper to America only, extending a very short way beyond the boundary of the southern continent. The third, which shows only a stronger developed variation of Nectarinia, is chiefly found in continental India, extending in small proportion to Africa; while the fifth is intermediate between the third and fourth, both in form and in locality, the Australian islands being its more peculiar strong-hold.

In the colouring of the group we find also a kind

* Vaillant considers the Humming-birds and Sun-birds represent, in their own class, the Bees and Butterflies among insects, performing, like them, the same services of impregnation.

of geographic restriction. It is in the two typical genera that we find the most brilliant colours and changing tints, and those patches of playful colour on the throat and head which so particularly mark the Humming-birds. In these the principal colours are various shades of steel-blue, always with metallic lustre, the head and throat often with patches of green, blue, or violet, of a scale-like texture, and giving out fresh tints with every change of position; but a marked difference in the rest of the arrangements is seen in the under parts being often of clear and very decided yellow, orange, or red, or being boldly marked with a broad bar of these colours. In these two genera, also, we see a slight development of the feathers springing from under the wings, which is often so beautifully displayed among the Humming-birds, and which also brings both, in part to resemble another suctorial family,—the Meliphagidæ or Honeysuckers. Here they are confined to small tufts of loose plumes, commonly of a yellow colour, but occasionally of a bright red: we have endeavoured to exhibit this structure in our Plates. It is in these forms also that we perceive the greatest variation in the form of the tail, which is in some long, at the same time having the plumes regularly graduating; in others the two centre plumes only are much elongated, sometimes more than equalling the length of the bird, and in a few instances being slightly spatulate at the tips; but in none of the known species have we an example of a forked tail. In the American portion of the

group we have the colours blue and green, varied by black; but almost without lustre or play of colour, and the throat and crown patches in a few just indicated; one or two species also are of unobtrusive tints, and in their entire form remind us of, and in fact run into, the Meliphagidæ and Titmouse warblers. In the Australian and Pacific groups, black and red are the prevailing colours, without lustre; the crown and throat patches marked by a difference in the structure of the feathers, and the general appearance of the birds in many parts allying them to *Myzomela*. Thus, from a portion of the plumage of the birds only, and without any assistance from the more essential parts of their forms, we could tell with nearly certainty to what division of the world the species belonged. The colours which we have been now alluding to are those adorning the male, and that in the African birds, according to Vaillant, continues only during the breeding season; so soon as the duties of this important period have passed, the same author states that they return or moult into the unobtrusive dress of the winter or rainy season; and as the time of change again approaches, birds may be seen more or less spotted, or in different stages of advancement towards their most splendid state. At the same time also the long caudal plumes are shed or lost, these also being only of temporary duration, as an adornment in the time of pairing and incubation. The colouring of the plumage in winter, together with that of the

females and young, are, in the two typical genera, shades of brown or greyish brown, without any metallic lustre, darker on the wings and tail, and having the coronal and gular patches sometimes slightly indicated by a difference in the structure of the feathers. It is from this cause that, as in many other instances, the numbers of species have been much increased and the synonymy much entangled; sufficient attention not having been paid to form and proportion in those states which were most liable to be confounded together.

The plumage, in its texture, is in general rather loose and disconnected, assuming the scaly form on the crown and throat; and it is in the typical forms only that we see the greatest diversity of its structure; it is here also only, that we have the scaly and imbricated distribution, the soft velvety feel (*N. amethystina*), occurring in the plumage of some of the *Paradiseadæ* and *Promeropidæ*, together with the axillary tufts before mentioned, so gorgeously displayed in both the above families, with occasional elongation of the tail-coverts (*N. splendida*). In some, also, the feathers forming the coloured pectoral bands are very large and full, and we believe that during the height of the season of courtship they can be and are erected at will, and exhibit a brilliant dress of attraction and contrast between the sober colours of the female. In describing his *Sucrier-Protée*, Le Vaillant states that the Dutch inhabitants denominate these birds by a provincial name

which indicates this display, so common that it has given rise to it. It is produced, however, in a different manner from the raising or displaying of the plumes, which in fact are too short to admit of their being exhibited or raised as ruffs or lengthened tail-coverts; but they have the power of changing the position of the feathers by a muscular action, so as to throw their brilliant reflective powers into view of the spectator, or to exhibit parts which were otherwise concealed; and he likens or compares this power to that possessed by some of the African antelopes, which at will suddenly display concealed white portions of the hair, which in that state forms conspicuous pale markings. It is during this season of incubation also, that any variation of notes is principally shown, as among the Humming-birds, the call when in search of food, or when irritated, is sharp, and indicates anxiety or a restless desire to obtain the object; but, unlike them, they possess at times an agreeable note or warble, having considerable melody. Vaillant states this of several species, and in the Voyage of Freycnet, indications of them being sometimes nocturnal occur, "At night they have a lengthened song, the modulations of which are very agreeable."* Latham adds to his description of the Blue-rumped Creeper, —"Said to sing as well as any Nightingale, with a sweeter voice."† The *Diceum hirundinaceum* sings in "a very animated and long-continued strain,

* Freycnet, p. 26. † Gen. Hist., iv. p. 239.

but is uttered so inwardly, that it is almost necessary to stand beneath the tree upon which the bird is perched, before its notes can be heard."*

In their habits, so far as we are acquainted with them, they are active and almost restless. The forms of the Old World constantly flit from shrub to shrub, and from flower to flower, in search of food, which, by nearly all our writers, has been described to be the sweet juices found in the bottom of the corolla or in the nectaries, or the sweet sap which several trees naturally give out; at seasons only, when these materials were wanting, repairing to the search of minute insects; in searching thus, they never employ the hovering flight of the Humming-birds, but clamber and suspend themselves by the trunks or branches in the manner most convenient to gain access to the, in many instances, lengthened corolla, and in their general activity now show a close resemblance to the Titmice, or scansorial warblers of America. The form of the bill and lengthened tongue are both adapted for being plunged into the tubes of flowers; but another structure in the bill induces us to believe that they (Nectarinia) are more insectivorous at all times than what has been generally considered. We mean the minutely and regularly dentated margins of the mandibles, so delicate as not to be perceptible without the aid of a magnifier. Now, we never find this structure where some prey is not to be seized and held. Among some of the Humming-birds it

* Gould, Birds of Australia.

is present, even more boldly developed; but these do take insects as food, and when better known, the species which possess the dentation may and will be found to vary very considerably in their manner of feeding.

In these observations, we are borne out by the remarks of a recent traveller and indefatigable observer; Dr. Smith tells us, in his Zoology of Southern Africa, "The birds of the genus Cinnyris have generally been regarded as feeding upon the saccharine juices which exist in flowers; but as far as my experience goes, I should be inclined to consider them as giving a preference to insects. In those I examined, I found the bulk of the contents of the stomach to be insects, though at the same time each contained more or less of a saccharine juice. The acquisition of a certain portion of the latter is not easily to be avoided, considering the manner they insert their bills into flowers, but the consumption of insects of a size such as I have found in their stomachs, must easily be obviated, provided these were not agreeable to their palates, and not actually a description of food which they by choice selected."

We find many of the species also frequenting a particular genus of plants, and even particular species. The Proteæ are in Africa general favourites. Vaillant's *Sucrier Figuer* frequents a species of scentless jessamine,* and these will no doubt be the resorts of peculiar groups of insects, affording a

* Vaill., vi. 159.

favourite food. Some of the Proteæ are remarkable for the quantity of juice afforded by them; from one, provincially called the sugar-tree, the juice is collected from the bottom of the flowers, and is sometimes boiled down to a thick syrup for the purpose of preserving fruits. Vast numbers perch themselves on the edge of the corollas, for the purpose of collecting the sweet juice; and one species, from its song, is often kept in cages, where it is maintained, "with difficulty, on sugar and water."* This would seem to show that these juices cannot alone afford them support. Sloane represents the American *Cœreba cœrulea* as feeding on the fruit of the sugar-cane.†

Among the Sun-birds, which also are constantly plunging their bill into flowers, we have no doubt that dissection will exhibit insects also, and in a greater proportion, according as we find the structure most developed. In most other forms of the family we find the bill much stronger, and the edges either rugged or very irregularly toothed; but in *Melithreptus* we have that member stronger still, and entirely unbroken on the edges, running smoothly to a sharp tip. This we would also consider in a great measure as insectivorous; and we have several instances among tenuirostral birds, whose curved attenuated bill is a very successful instrument in searching out minute insects. The various Dendrocolapti show a most remarkable curvature, which

* Barrow, Travels in South Africa, p. 62.

† Latham, quoted from.

will be found in some way adapted to secure the peculiar insects which may afford them sustenance. The Hoopoe is an example among our native birds, while the Cornish Chough will furnish another still more striking; for in fact the bill of Melithreptus is almost a model of that of Pyrracorax, both of them entire, finely attenuated, and much curved; and Montague speaks of the aptness and facility with which our native bird could procure minute objects. We do not mean by these remarks to insist that the Sun-birds are not partially meliphagous, because we know the contrary; but we think that their fine colouring, and habitation amidst sweets and beautiful blossoms, have been too much associated with delicacy of food as a cause of the former, and have given, as it were, a poetical licence to their describers.

Vaillant, considering the sweet juices of plants to be the sole food of the Sun-birds, looks at the tongue only as a member for collecting honey. He describes it, exteriorly, of a horny substance, hollowed, and forming a kind of tube, of which the anterior extremity is supplied with many nervous threads, forming the seat of taste, and also serving as a kind of sieve to prevent the grosser matters to pass; while the horns of the hyoid bone, being lengthened, pass over the skull and serve as the same parts in the Woodpecker, to dart out or protrude the tongue for the purpose of reaching support, whether vegetable or animal, which is concealed in the deep tubes or corollas of many gorge-

ous blossoms. Audebert and Vieillot lean nearly to the same opinion of these birds being in a great measure meliphagous*, and they give figures and descriptions of several modifications in the structure of the tongue. In some it is long and bifid, being cleft even to the centre of its length, and occasionally these divisions are ciliated upon the sides; in other species the tongue is in the form of a small brush or pencil, as among many of the True Honeysuckers. The more general form of the tongue, in the typical Nectariniadæ which we have examined, is lengthened and slender, with a shortly bifid fringed apex, having the edges for the whole length turned over inwards, artificially forming a double tube, as exhibited in the annexed diagram of a section of the tongue of *N. fulginosa*, but in another



genus which we have introduced into the family (*Arachnothera*, Temm.), we have the tongue comparatively short and hard.

In their nidification, the Sun-birds also present some difference from the Humming-birds, though we perhaps know less about the nests and the places where their fabric is reared; the exquisite structure and curious small size of those of the latter being objects of request or curiosity, even to many who do

* The general name of the Malays is "Cheehop," or the "Suckers."

not generally take an interest in such productions.—Many of the Sun-birds breed in the clefts and hollows, or worm-eaten trunks of trees, where no nest possessing external interest is found; * others place the "nest among thick bushes, and form it of the down of plants, covering it externally with lichens or fine mosses. † Of the nest of an Indian species Dr. Latham thus writes, upon the authority of General Hardwicke, "The nest composed of fine downy materials, mixed with a few dead leaves, in shape nearly globular, about three inches in diameter, and at bottom runs to a point, at least four inches beyond it; the entrance at the top, and on one side, next to the branch to which it is attached, has a kind of hood or cover over the entrance." ‡ In most, where we have any notice of them, the eggs are described as of a pale colour, bluish, grey, or reddish, with brown or greenish spots; in the Humming-birds they are generally white. The nest of the *N. goalparensis* is represented by Professor Royle as suspended, and having the hole or entrance near the upper part, the materials of which it is constructed being rather coarse. From these descriptions and the next, the character of the nests of the Indian species partakes more of those of the Orthotomi and tailor warblers. Mr. Jerdon writes of the *C. Mahrattensis*, "I have seen the nest of this pretty little bird close to a house at Jaulnah.

* Vaillant, Sucrier eblouisant, S. velour.

† Ditto, S. Oranga.

‡ Lath. Gen. Hist., iv. p. 233.

It was commenced on a thick spider's web, by attaching to it various fragments of paper, cloth, straw, grass, and other substances, till it had secured a firm hold of the twigs to which the web adhered, and the nest suspended on this was then completed by adding other fragments of the same materials; the hole is at the one side, near the top, and has a slight projecting roof or awning over it." *

* Mr. Jerdon's excellent Catalogue of the Birds of the Peninsula of India. Madras Journ. of Science, Sept. 1839, *et seq.*

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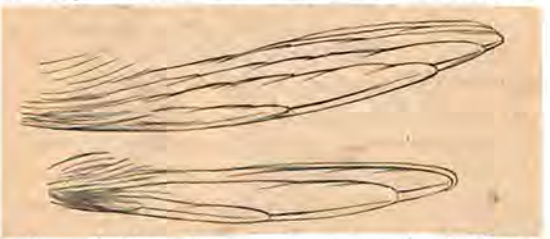
NATURAL HISTORY

OF THE

NECTARINIADÆ OR SUN-BIRDS.

DESCRIPTIONS.

Among the typical genus of the Nectariniadæ, we have the greatest contrast of species, as well as considerable variety of form; the latter occurring principally in the shape of the tail, which is even, much elongated, and wedge-shaped, or having the two central feathers only narrow and lengthened. The wings are rather rounded, with the first quill

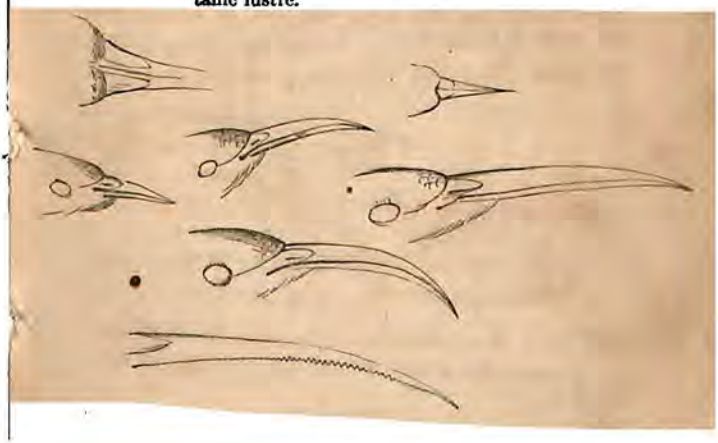


short, and the plumage is extremely brilliant, having generally a coronal and gular patch of me-

tallic lustre, the under surface of the body banded with some bright shades of steel-blue, red, or yellow. The birds now alluded to may be thus characterised :—

NECTARINIA, *Illiger*. GEN. CHARACTERS.—Bill slender, curved, very fine, and acute at the tip, dilated at the base, edges of the mandible folding over the maxilla, maxilla narrow in depth at the base, edges of both minutely and regularly denticulated; tongue lengthened, slender, with a shortly bifid fringed apex, the edges for the whole length turned over inwards, forming a double tube; wings, with the third quill longest, first short, nearly spurious; tail even, lengthened and much graduated, or with the two centre feathers only elongated; tarsi and feet fully developed, the hallux lengthened and with its claw proportionally strong. Types, *N. famosa, chalybeia, amethystina*.

Note. India and Africa, principally within the tropics. Colours of the plumage brilliant; with metallic lustre.



THE LESSER DOUBLE-COLLARED SUN-BIRD.

Nectarinia chalybeia, LINNÆUS.

PLATE I.

By several early ornithologists, and occasionally down to the present time, the two birds from Southern Africa, known under the names of *Certhia chalybeia*, Linnæus, and *Sucrier à plastron rouge* of Le Vaillant, have been confounded with each other; and we believe a third may now be added from the western coast, which, though closely allied to the first, seems to present variations in size and colouring. As representing the African even-tailed form of Nectarinia, where the colours of the lower plumage are distributed in the form of bands, we shall now describe the three birds in their turn.

This very beautiful species was considered by Le Vaillant to be distinct from his "Sucrier à plastron rouge," though it had been by some authors confounded with it; and this opinion seems now to have been confirmed by most modern ornithologists, who generally retain for them the distinguishing names of "Greater and Lesser Collared Sun-birds;"

* The authority, placed after the Latin name of the bird, will be understood to refer to the *specific* name only.



NECTARINIA CHALYBEA

Native of S.Africa.

our present specimen being distinguished by its more diminutive size, its more extended locality, the collar of blue stretching round upon the sides of the breast, by the less extent of crimson, and by the paler and purer tint of the belly and vent. This bird extends in range from Southern to Western Africa; the specimens which we now describe were sent to us from the vicinity of the Cape by the attention of Dr. Smith, while Mr. Swainson has admitted it into his History of the Birds of Western Africa, published in former Volumes of "THE LIBRARY." We regret that very little has been recorded of its habits, and by Vaillant alone it is stated that it frequents the vicinity of the Cape, as well as the woods in many parts of the interior of the colony; that in the latter it builds in the hollows of trees, while in the former, where there is chiefly brush-wood, the nest is found in the larger bushes.

The entire average length of our specimens is about four inches six-tenths, which, when compared with the dimensions of the next, will show a great discrepancy. The head, neck, back, rump, throat, and upper part of the breast are of a golden green, varying in different lights; immediately below the green of the breast there is a narrow crescent-shaped band of rich steel-blue, extending completely round and upwards, and terminating on the sides of the neck, it is also played on by the light; and succeeding this is a band of crimson about double the breadth: the remaining under parts are greyish or pale brocoli-brown, paler towards the vent and

under tail-covers; from the sides of the breast, on each side of the red band, spring tufts of king's-yellow, the feathers composing which are rather longer than those covering the flanks. The wings and tail are blackish-brown glossed with green, in some specimens hair-brown, which chiefly occurs in birds before the change of breeding-plumage takes place. The upper tail-covers are rich violet-purple.

A female from Southern Africa is in length about four inches four-tenths. The colour of the whole plumage is a brocoli-brown, darker on the wings and tail, and much paler in shade on the under parts; bill and legs brownish black.

To exhibit the distinctions we have alluded to in the above description, and also to represent another very beautiful bird of this form, we give a figure of the "Sucrier à plastron rouge of Le Vaillant," under the title of



THE GREATER DOUBLE-COLLARED SUN-BIRD.

Nectarinia Afra, LINNÆUS

PLATE II.

THIS really splendid species has nearly the same distribution and colour of the markings with the last, but is at once known by its much larger size, the extreme length of the males being rather more than five inches and a half. The distribution of the golden green on the head, neck, and upper parts is nearly similar, but it is of a more bronzed lustre, and on the throat the feathers are more compact and scutellated. The steel-blue band immediately succeeding the green is darker and more violet-coloured, and the tips of the crescent do not extend so far upon the sides of the breast: the crimson band is seven-eighths or nearly an inch in breadth, and the remaining under parts are yellowish wood-brown and nearly uniform in tint; the upper tail-coverts are violet-purple, and the wings and tail are dark blackish brown glossed with green. The yellow axillary tufts are also present. This state of plumage is what Le Vaillant considers to be that of the male in his highest breeding state. A female is only five inches and one-eighth in length, and

is entirely of a greenish hair-brown, paler on the under parts, and having a yellowish tint on the chin, vent, and under tail-coverts,—the wings, tail, and crown of the head being a few shades darker. These specimens, received from Southern Africa, were collected by Dr. Smith.

According to Le Vaillant this species does not reach nearer to the southern point of Africa than where the extensive forests of the eastern coast terminate; but it stretches into Caffraria, and also to the Gamtoos and Sondag rivers. It frequents the forests, sometimes also descending to the plains, constructs a nest in the hollow of some tree, and lays from four to five eggs of a bluish white colour, marked with tawny.

During the rainy season, or when the time of incubation is past, the same traveller states that the male assumes exactly the dress of the female, except that the vent is of a more yellow tint, and that the axillary tufts, which the female never possesses, are preserved. The young of both sexes are of a reddish grey above, olive beneath, and on the throat whitish.



NECTARINIA CHLOROPYGIA.

Native of W. Africa.

THE GREEN-RUMPED DOUBLE-COLLARED SUN-BIRD.

Nectarinia chloropigia, JARDINE.

PLATE III.

THE third bird which we alluded to, as allied to these, formed part of a small collection brought to this country on the return of Dr. Stanger, in 1841, from the Niger expedition, and kindly entrusted to us by Mr. Waterhouse. One specimen only appeared among these, but Dr. Stanger allowed us to compare a second at Manchester, which corresponded with that previously seen. Its nearest connexion is with the first, or Lesser-collared Sun-bird, for which it was first mistaken; and while it presents considerable variations, it may still remain a question how far local circumstances may influence varieties, and also whether the birds from that part of the African coast continue constant in the markings, &c. which seem to separate our two birds. The distinctions are a less size and less proportional length of the wings and tail; the want nearly of the blue collar, that being indicated by a deeper green, slightly tinted with blue; by the under parts and flanks being pale oil-green, whereas they are brocoli-brown in the other; and by the

upper tail-coverts being of the same brilliant green with the head and back, and not rich violet-blue as in the bird from Southern Africa.

In the bird from the Niger, the upper parts, wings and tail excepted, are of a very rich emerald bronzed green; the wings and tail are brownish black, on the former the edges of the feathers being dull oil-green. The chin is deep velvet-black, shading into the neck and upper parts of the breast, which are similar in colour to the upper parts, and finish on the breast by a deep bluish green band, the prototype of the blue collar of the two former birds; this is succeeded by the crimson band, nearly similar in extent to the same part in the *N. chalybeia*, and having the tips of the feathers on the upper part of it narrowly edged with golden green, while the belly, flanks, vent, and under tail-coverts are of a pale oil-green; the ample axillary tufts are rather paler in tint. In addition, we give the dimension of the Cape and Niger birds:—

	CAPE.	NIGER.
Entire length . . .	4 in. 6-10ths	4 in. 1-10th
Bill to forehead . . .	7¾-10ths	7-10ths
Wing to longest quill .	2 in. 3-10ths	1 in. 9-10ths
Tail from extremity of upper covers . . .	1 in. 1-10th	7-10ths
Tarsus	6-10ths	5½-10ths

We have not seen specimens of the Lesser Double-collared Sun-bird from the Western coasts of Africa which we could compare with those from the Cape, but it is not impossible that the bird which

served for the description of *C. chalybeia* in the "Birds of Western Africa," may have been that now before us; and the "greenish tinge" on the narrow blue collar, and the "tail-coverts banded with greenish blue," almost lead us to believe that this has been the case.

In Le Vaillant's description of "Sucrier à plastron rouge," a bird inhabiting the forests of Auteniquoi, nearly allied, is described as almost intermediate in colouring between the greater and lesser collared birds, the crimson band being less in breadth; and what at once distinguishes it, it has all the red feathers transversely marked with lines of a rich golden green. By referring back to our description, it will be seen that the red band in our present bird is partially marked in this way.

BIFASCIATED SUN-BIRD.

Nectarinia bifasciata, SHAW.

PLATE IV.

THE banded distribution of colouring appears to be of frequent occurrence in this group, as seen most decidedly in the beautiful birds we have just described; in that before us, we have it continued in a manner a little less distinct, while the colours continue to bear resemblance. We are indebted to Dr. A. Smith for the use of the specimen which we now describe and figure, from the collection at Fort Pitt, Chatham, and which has marked, as its locality, "Interior of Africa." The whole upper parts, wings and tail excepted, are of the same rich bronzed green of the greater and lesser collared birds, approaching to emerald-green on the lower back and rump; on the shoulders the base of the feathers is black, having a broad round fringe of greenish at the tips, as in *N. famosa*, and which exhibits a rich spotted contrast. The wings and tail are nearly black, glossed with green, the latter on its edges, with purple. Underneath the chin is of a deep velvet-black, changing on the nock and upper part of the breast to the same



NECTARINIA BIFASCIATA.

Native of interior of Africa.

bronzed green of the head and back, but having a greater tinge of golden yellow, — this again is shaded into a narrow band of steel-blue, succeeded by another of a dull red, in some lights appearing almost brown, in others dull vermillion-red, and having the tips of the feathers narrowly banded with steel-blue; the remaining under parts are dull black, glossed with blue on the lower tail-coverts, and immediately succeeding the red band. The entire length of the specimen is five inches and three-tenths, the proportions not showing any important variation. The first quill is unusually short, compared with species of similar size. There are no axillary tufts.

SPLENDID SUN-BIRD.

Nectarinia splendida, SHAW.

PLATE V.

THIS is a large species, and certainly, when the male is seen in his full breeding dress, one of the most gorgeously dressed of the whole tribe. Le Vaillant found this bird in the country of the Great Namaqua, near the Fish River, but only during the season of incubation; so that it is probable a more western locality may be its true and continuous habitation. It is introduced by Mr. Swainson in his Birds of Western Africa, and our own specimens were received, by the attention of Dr. W. Fergusson, from the vicinity of Sierra Leone. In the country of the Namaquas the nest was placed in the worm-eaten trunks of mimosa trees, and contained from four to five entirely white eggs.*

The total length of the adult male, measured from Sierra Leone specimens, is from five inches and a half to five and three-quarters, being nearly an inch longer than the measurements given by Mr. Swainson. The back of the neck, back, shoulders, and upper and under tail-coverts, are brilliant golden green, varying with every change of light;

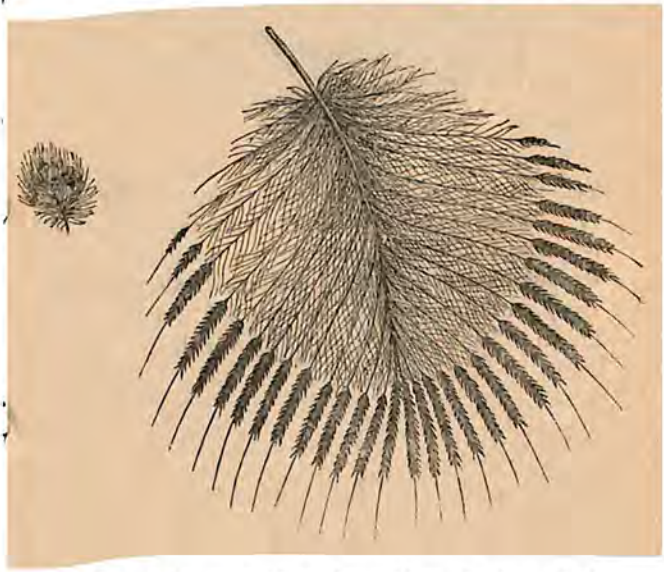
* Le Vaillant, vi. p. 163.



NECTARINIA SPLENDIDA.

Native of W Africa.

the head and throat are steel-blue, in some lights appearing as black, in others as rich violet; across the breast there appears in most lights a band of scarlet, but in some positions it appears as if banded with steel-blue, golden green, or violet, and at times to be almost entirely composed of one of those tints; this is occasioned by the structure of the feathers, near the base the colour is of the metallic tints alluded to, but the tips of the plummules are length-



ened into fine vermillion tips without barbs, which are so slender as sometimes to be entirely lost when seen against the dark tint of the feather lying be-

neath. On the sides of this beautiful bird spring two axillary tufts of pale lemon-yellow. The breast, belly, and flanks, wings and tail, are deep black, —the latter edged with golden green. In this species also the tail-coverts are of an unusual form, very nearly as long as the feathers of the tail, the webs very ample, loose, and unconnected. The legs,



feet, and bill are black. The female, according to Le Vaillant, is entirely of an "earthy brown," paler beneath, tinted with olive on the wings and tail, the last having the lateral feathers bordered exteriorly with dirty white; the bill and feet blackish brown. The young resemble the female.



NECTARINIA COLLARIS. M.F.

Natives of S.Africa.

LITTLE BLUE-BANDED SUN-BIRD.

Nectarinia collaris, VIEILLOT.

PLATE VI.

THIS pretty little Sun-bird was met with by Le Vaillant in the vicinity of the Gamtoos, in troops of eight or nine birds, the amount of the broods. We have only received the males in miscellaneous collections from Southern Africa, where, by some of our correspondents, it is said to be rare; but a specimen of the female has been put in our possession by Dr. A. Smith, procured at the Cape, and agreeing with the description of authors. In extreme length it is about four inches, some specimens slightly exceeding, while others do not reach it. The bill, to the forehead, is half an inch, becoming very slender towards the tip; the upper parts, edges of the wing-coverts, and secondaries, a bright yellowish green, changing with every position; the wings umber-brown, edged with oil-green; the chin, throat, and upper parts of the breast similar, but deeper in tint, shading into and terminating in a narrow band of rich blue, glossed with violet; the remaining under parts are of a dull yellow, and in the axillæ there are tufts of pale primrose-yellow. The tail, slightly rounded, is black glossed

with blue, the feathers edged with rich shining green.

In the female above alluded to, the upper parts are nearly similar, but having a greater mixture of yellow; this extends slightly over the cheeks and sides of the neck, but the chin and throat are yellowish white, shading into dull gamboge-yellow, which occupies the remaining under parts, becoming bright in the centre of the belly and vent, and there is no trace of the brilliant gular and pectoral patch and band which characterises the male.—Le Vaillant remarks that the young, whether males or females, had the plumage of the adult female, above being a little less brilliant, while underneath the tint of the yellow was not so deep.



NECTARINIA VENUSTA.

Native of W. Africa.

LITTLE VIOLET-BANDED SUN-BIRD.

Nectarinia parvula, JARDINE.

PLATE VII.

We have been permitted to examine a specimen of a Sun-bird very closely allied to the last, by the attention of H. E. Strickland, Esq., evidently identical with the *N. pusilla* of Swainson's Birds of Western Africa; the name given to it by that author, however, having been previously used both by Linnæus and Vieillot, we have endeavoured to supply it with another bearing a meaning somewhat similar. In size it is rather less than *N. collaris;* in length, so far as we can measure from the skin, being between three and a quarter and three inches and a half; that of the bill, to the forehead, about six-tenths. The crown, cheeks, back and sides of the neck, back and rump, are of a bronzed green, not so yellow in tint as in the last; the forehead is violet, gradually shading into the green of the other upper parts; the upper tail-covers steel-blue; tail black, margined on the outer webs with green. The wings clove-brown; quills and secondaries edged with olive. Beneath, the chin is black; fore part of the neck bluish green, terminating in a distinct

band of violet, which stretches round on the sides of the neck, and at its sides below, is succeeded by dull black, forming an angular patch on each side of the breast, almost losing itself in the centre of the violet band. The remaining under parts are light king's-yellow, paler on the vent and under tail-covers; the axillary tufts are bright orange-yellow, easily distinguishing it from the last.

The two following species possess a more sombre colouring; and, as it were, to relieve this, the axillary tufts, which we have hitherto seen to be pale lemon-yellow, are in some instances bright orange-red and scarlet.



NECTARINIA FUSCA.

Native of S. Africa.

NAMAQUA, OR WHITE-VENTED SUN-BIRD.

Nectarinia fusca, VIEILLOT.

PLATE VIII.

SPECIMENS of the male of this species have been furnished to us both by the Zoological Society of London and from the Fort Pitt Museum at Chatham. Le Vaillant met with it only in the country of the Great Namaqua, where he found it remaining during the whole year, and considered it as nearly confined to the bounds of that district; the nest was discovered in the hollow trunks of trees, the eggs from four to five in number, and of a greyish colour. Specimens in our own collection were received many years since from Southern Africa by the attention of Dr. Smith, but the exact locality is not known.

The crown, cheeks, neck and back, are of a purplish brown, having metallic reflections of purple, caused by the prolonged tips of the feathers being of that colour, or in some lights greenish; the lower part of the back and rump clove-brown, and the upper tail-coverts steel-blue, without much reflection; the wings are dark clove-brown, approaching to umber-brown on the quills; the tail is blackish

brown, glossed with blue. The chin is dull black, and the fore part of the neck and breast are purplish brown having purple and green reflections, shading into blackish brown on the flanks and upper part of the belly, and which again runs into white on the vent, flanks, and under tail-coverts. From each axilla springs a tuft of bright orpiment-orange plumes, contrasting decidedly with the otherwise comparatively sombre appearance of the bird. The specimens in our own collection, above alluded to, are above entirely clove-brown, the breast and throat only shewing a dark and metallic lustre. The length is from four and a half to four and three-fourths of an inch.

The female is described by Le Vaillant as of a greyish brown above (probably of the brocoli or hair-brown which marks the same parts of the male), and beneath of a dirty white. The young, again, are said to be of a reddish brown above, below of a reddish white, and the males in this state can be distinguished by a pale yellow spot which marks the position of the axillary tufts.



NECTARINIA VERROXII.

Native of Kafirland.

VERREAUX'S SUN-BIRD.

Nectarinia Verroxii, Smith.

PLATE IX.

The Zoological Society of London have permitted us to examine and describe both sexes of this species, placed in its collection, we believe, by Dr. Smith. The head, neck, shoulders and back, are of a dark bluish green with metallic lustre, but both in this and the preceding bird somewhat interrupted from the dark base of the feathers appearing, the fringe of the tips only being of the more brilliant colour. The lower part of the back, rump, and upper tail-covers, wings and tail, purplish brown, darkest on the tail, which, excepting the slightly shorter outside feathers, is square at the end. The lower parts, in the specimen before us, were pale hair-brown, slightly tinted with yellow on the chin and vent; Dr. Smith describes them as yellowish grey, and his figure represents a very clear tint. The axillary tufts are here of a brilliant scarlet, and appear conspicuously. The female above is uniformly brocoli-brown, darker on the wings and tail; beneath of a paler tint of the same colour, tinged with greenish yellow, and approaching to yellowish grey on the vent and flanks.

Dr. Smith remarks, "Only a very few specimens of this bird have yet been found in South Africa, and none, as far as I know, within the limits of the Cape colony. Kafirland, and the country east of it, towards Port Natal, furnishes the specimens we possess. Like the other species of the group, it feeds upon small insects, and these it collects partly from the branches and leaves of brushwood and dwarf trees, and partly from flowers." The same author also adds a short notice of another species considered new,—

NECTARINIA OLIVACEA, Smith.

"The colour of this species above is intermediate between grass-green and olive-green, the head being strongly tinged with blue; below it is light yellowish green, with an orange tint on the throat, and on each axilla there is a small tuft of brilliant yellow feathers. Length from the base of the bill to the point of the tail five inches, length of the bill one inch three lines."

FINE-BACKED SUN-BIRD.

Nectarinia rubro-fusca, SHAW.

SPECIMENS identical with the bird we are now about to describe from our own collection occur in the British Museum, the Museum of the Zoological Society, and at Fort Pitt, Chatham, but all without any name attached. We have referred it to the species of Shaw above named, and consequently to the bird figured by Mr. Swainson in the Birds of Western Africa. Its other synonymes will be found in our Synopsis, and we would merely observe, that all the specimens we have examined are very close and similar in their markings and the tints on the plumage.

The length of our specimen is about four inches eight-tenths, and it is a bird of rather slender make. The crown, back, and sides of the neck are of a rich reddish purple, with a bronzed or coppery lustre; the middle of the back, the rump, and upper tail coverts, rich auricula-purple with a changing lustre, richest on the coverts, and losing itself upwards in the tint of the head and neck; the chin, throat, and upper parts of the breast are of a shade intermediate between these, the purple prevailing, and all the other parts of the plumage are deep black, tinted

with blue on the wings and tail. On the band of each wing there is a patch of rich violet-purple. There are no axillary tufts.

By the attention of Mr. Louis Frazer, we are enabled to add a description of the female, from specimens procured at Cape Coast and Accra, during the progress of the late Niger expedition, and forwarded to us for the use of the present volume. Plumage above, including the wings, dark brownish oil-green, deepest on the latter; beneath, pale wax-yellow, clearest on the centre of the belly; tail nearly black, the outer feathers tipped with grey. Length, three inches four-tenths; of the bill to the forehead, six-tenths.

Mr. Swainson's specimens of his *N. erythronotus* were received from Senegal, and Vieillot's *N. tricolor*, which we consider closely allied, if not identical, was from Malemba.



NECTARINIA CYANOCEPHALA.
Native of Sierra Leone.

OLIVE-BACKED SUN-BIRD.

Nectarinia cyanocephala, SHAW.

PLATE X.

DR. WILLIAM FERGUSSON, some years since, sent us both sexes of this species from the vicinity of Sierra Leone, and we refer them without hesitation to the "*Soui-manga à tête blue*" and the "*Soui-manga vert et gris*" of Vieillot, *Oiseaux dorés*, pl. VII. and XXV.; the first as the male, the latter as the female. The male is in length five inches and a half; the female about a quarter of an inch shorter. In the first sex, the head, throat, neck, and upper part of the breast are deep black, having the tips of each feather broadly banded with a rich and dark metallic bluish-green, giving to those parts an almost entire tint of the latter colour, which varies with every shade of light, and in some positions is coloured with steel-blue reflections, particularly upon the breast. The upper parts, including the edges of the feathers of the wings and tail, are yellowish olive, or a clear yellowish oil-green, without any reflected lights; the wings and tail are pale umber-brown; the lower part of the breast, belly, and vent are of a uniform tint of brocoli-brown, and from each axilla spring

tufts of primrose-yellow. The bird which we received in the same collection from Sierra Leone as the female, is, as we stated, about five inches and a quarter in length, and it agrees in plumage with the description of Vieillot's "*Soui-manga vert et gris.*" The crown, nape, cheeks, and sides of the neck are of the same rich bluish green seen in the male, the back and wings are also similar in tint, but the whole chin and under parts are of a uniform greyish white, paler on the vent, and there tinted with yellowish oil-green. We have little doubt of this being the female; there is no trace of immaturity in the specimen.

We have also, among the African forms of even-tailed Sun-birds, species of uncommon brilliancy of colouring; and which, as in the Humming-birds of the New World, possess a coronal and gular patch of resplendent scale-like feathers. Examples of these will be seen in some of our next plates.



NECTARINIA SENEGALENSIS.

Native of Senegal.

THE SENEGAL SUN-BIRD.

Nectarinia Senegalensis, LINNÆUS.

PLATE XI.

THIS species, instead of having the upper parts and the breast of a uniform brilliant tint, has only a marked coronal and gular patch of rich emerald-green; that on the throat extending upon the cheeks, where it exhibits a streak or moustache separated by the different structure of the feathers, the chin and throat being also more yellow in tint. Space between the eye and bill deep black; the back of the neck, upper parts, wings and tail, belly and vent, are of a soft and deep brownish black, glossed with purple, appearing and feeling to the touch like velvet. The fore parts of the neck and breast are brilliant scarlet-red, appearing in some lights violet-blue; this change is caused by each feather, black at the root, having a band of violet-purple, immediately succeeded by scarlet tips, which in a state of rest nearly conceal the blue, or allow it only to be partially seen through; the feathers composing this part are, to the feel, of a stiffer texture than general, and are capable of being erected and displayed at pleasure, giving at one time a totally

different appearance than what is seen upon another change; this is what suggested the name of "*Protée*" to Le Vaillant, who considers that this species and some others thus display themselves during the time of courtship as an attraction to the other sex. This beautiful plumage ceases with the season of incubation, and the male assumes nearly that of the female, which is of a uniform wood-brown tinted with yellow on the belly and vent; the bill and legs are in this sex brown, while in the opposite they retain at all seasons their deep black colour. In an intermediate state of plumage the upper parts are of a reddish brown, and the lower parts of a yellowish wood-brown, having the splendid feathers of the throat and breast appearing among it; on the belly and vent the feathers have the centres darker, giving a streaked appearance to those parts. In none of the conditions of plumage have we any trace of the axillary tufts seen in the two last birds. Caffraria and Senegal are the localities generally assigned to this species, our own specimens were received from the vicinity of Sierra Leone, while Le Vaillant states that it is found on several parts of both the east and west coasts.



NECTARINIA NATALENSIS

Native of Port Natal.

Stewart del.

PORT NATAL SUN-BIRD.

Nectarinia Natalensis, JARDINE.

PLATE XII.

An equally beautiful species, the metallic colours appearing more brilliant from the deep and velvety colour and texture of the other parts of the plumage, we have received from the vicinity of Port Natal. We have seen specimens also in the Fort Pitt collection, which were considered by the active superintendent there as undescribed; in the Zoological Society also there is a specimen marked by Rüppell, though we could not ascertain that it was procured by that traveller during his excursions.

In our specimen, the coronal patch, confined to the forehead and crown, is of a rich bluish-green. The gular patch, of a golden-green, is confined to the chin and throat, and is bordered on each side with a narrow maxillary stripe of the same colour with the crown. The upper parts, cheek, and sides of the neck are of a very deep soft and velvety umber-brown, paler on the wings and tail, the bend of the wing having a violet patch. On the under parts, the fore part of the neck and breast are of a brilliant scarlet, appearing, in different lights,

waved with violet, from the structure of the feathers being the same as those of *N. Senegalensis* and *splendida;* the simple apical tips only being scarlet, and producing all the brilliant effect. The remaining under parts are very deep blackish-brown appearing in some lights almost black. The feet, legs, and bill are black, the former strong. The length of the specimen described is within a tenth of being six inches.



NECTARINIA AMETHYSTINA

Native of S. Africa.

AMETHYST-THROATED SUN-BIRD.

Nectarinia amethystina, SHAW.

PLATE XIII.

THIS bird differs in several respects from any of those we have yet described, and though of apparently more sombre colouring, it possesses some hues of exceeding brilliancy. It is, with one or two exceptions, one of the largest species known, being in extreme length from five and a half to six inches. The whole of the plumage of the adult male, in a breeding state, with the exception of the parts we shall immediately mention, is of a very deep brownish black, feeling and looking like velvet, and on the upper parts, when held side-ways to the light, having a rich play of purple. The coronal patch is dark emerald green; on the throat and fore part of the neck there is an oval patch of rich amethystine purple, and on the carpal joint of the wing and upper tail-covers the feathers are of the same beautiful tint, but more inclining to violet,—in all these parts playing and changing with the variation of the light. The axillary tufts, as in the last, are wanting. In the plumage of the winter or rainy season, the male resembles the female; but, unlike the previous birds, retains, it is said, his

coronal and gular patch; before the first moult, or in the nestling plumage, however, these are wanting. In the female, according to Le Vaillant, the upper parts are of an olive-brown, the throat and fore part of the neck black, and the remaining under parts olive, spotted or broadly streaked with deep brown.

Le Vaillant first met with this bird in the country of the Auteniquoi, afterwards on the river Gamtoos, and considers that it remains in the southern part of the continent during the whole year. Our own specimens of the adult male, which have now been used, were received from some part of Southern Africa, though we do not know the exact locality. Mr. Swainson has also admitted it into his Birds of Western Africa, so that we may consider its range pretty extensive. Le Vaillant states that he found the nest in thickest bushes, and in the holes in trees; the eggs being five in number, grey, spotted with olive.



NECTARINIA FULIGINOSA.

Native of W. Africa.

CARMELITE SUN-BIRD.

Nectarinia fulginosa, SHAW.

PLATE XIV.

THIS apparently not very well known species does not seem common in our collections; there is a specimen in the British Museum, another in the Collection at Edinburgh, from which our figure has been taken, and Mr. Strickland has obliged us with the use of a specimen from among his Nectariniadæ, from which we have made our description.

The body, above and below, is uniform pale yellowish umber-brown, the wings and tail considerably darker, and with a slight purple reflection; the forehead has an imbricated patch of auricula purple, extending to the line of the eyes and the chin, throat, and fore part of the neck, forming the gular patch, with the lesser wing-covers or radial edges of the wings, are of the same colour; the axillary tufts are bright primrose-yellow. The entire length about five inches. The female is said to want the coronal patch.

Malemba, on the west coast of Africa, is given by Vieillot as the locality of this species, but we are not aware where those which have come under our own observation have been received.

THE NIGER CARMELITE SUN-BIRD.

Nectarinia Stangerii, JARDINE.

PLATE XV.

THE next specimen we have to describe, as entering into the artificial division with coronal and gular patches, is one which, independent of its remarkable colouring, will possess an interest as part of the limited collection procured during the late Niger expedition, and brought to this country by Dr. Stanger. It was placed under our inspection by the kindness of Mr. Waterhouse, curator to the Zoological Society, and, after examination, we have been unable to refer it to a described species. It approaches nearest to the last, but differs from it in the frontal and gular patches being green instead of violet, in there being no violet on the lesser wing-covers, and in wanting all trace of the axillary tufts. The following is an exact description of the specimen, and we may remark that it appears in every way to be in full and perfect plumage.

The entire length is five inches one-tenth; of the bill, five-tenths; of the wing, to the longest quill, two inches and a half. The upper parts are of a uniform deep yellowish umber-brown, darker on the wings and tail; the whole plumage having



NECTARINIA STANGERII.

Native of W. Africa.

the velvety feel and appearance of *N. amethystina*, and showing yellow and greenish lights. Underneath, the plumage of the same texture is deep umber-brown, and, when seen across, shows rich purple reflections. The forehead, until within the line of the eyes, is covered with the scale-like feathers of deep green, the last row of feathers being rich violet, forming, as it were, a narrow band of that colour. The chin is velvety-black, and, following it, the gular patch is rich yellowish-green, playing in the light, reaching to the upper part of the breast, and having the last row of feathers deep steel-blue tipped with scarlet, at a little distance appearing as a violet termination, bordered by a scarlet thread. On each maxilla there is a narrow stripe of deep shining green, similar to the forehead in colour. No trace of axillary tufts or colouring on the shoulders. Bill, legs, and feet black.

As in Africa we have the Nectariniadæ in the greatest profusion, both in numbers and species, so do we find the more varied forms. These are most apparent in the form of the tail, which is square, wedge-shaped, or has the centre feathers only much elongated; the first we have seen in the species we have been describing, and as an example of the second we now give the representation of the

VIOLET-HEADED SUN-BIRD.

Nectarinia violacea, LINNÆUS.

PLATE XVI.

THIS bird, a native of Southern Africa, has, in the adult males, the head, sides of the neck, and chin, with the upper part of the back and bend of the wings, dark golden-green varied with purple and bronzed reflections; on the upper part of the back the base of the feathers are olive, and are seen mixed with the dark and shining tint; the back and remaining upper parts, with the edges of the wings and tail-feathers, are yellowish oil-green; the quills and tail pale umber-brown. On the centre of the breast and running round on each side the green colour of the neck, is a patch of brilliant violet-purple stretching up upon the throat and nearly bordering the lower part of the breast in a narrow crescent. The lower part and centre of the breast is deep reddish-orange, shading into gamboge-yellow on the flanks and under tail-covers. In the axillæ we have the king's-yellow tufts. The extreme length is nearly six inches.

According to Le Vaillant, the female is rather smaller in size, and is of a uniform olive-green,—



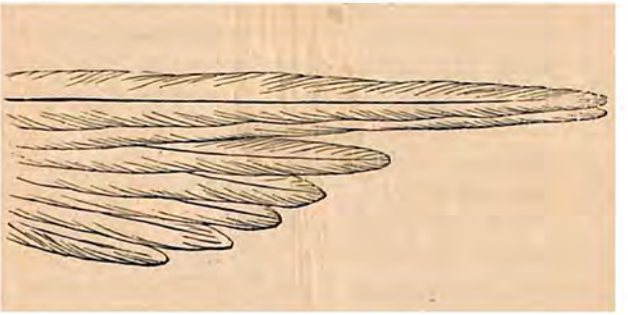
NECTARINIA VIOLACEA

Native of S. Africa.

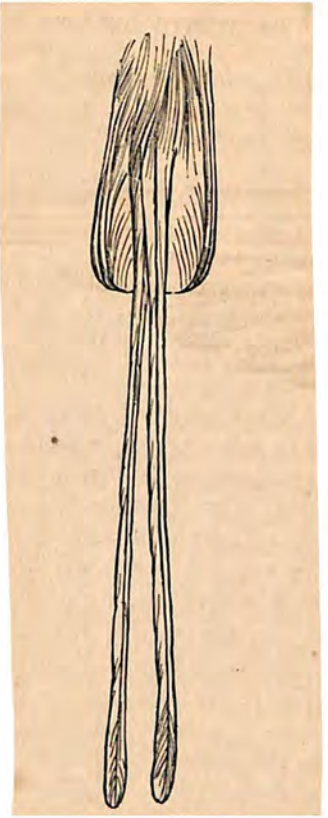
paler, and of a more yellow tint beneath. The young of both sexes nearly resemble each other, and are above greyish olive, beneath yellowish. The species is abundant in the vicinity of the Cape, but it delights in the more mountainous districts, and only descends to the gardens during the season of the flowers, and while the orange trees are in blossom. The male has a quick, lively, and agreeable warble. The nest is placed in thick bushes, formed of the down of plants, and covered exteriorly with lichens or fine moss. The eggs are white, mottled with minute brown dots. Latham says the structure of the nest is loose and artificial.

The tail, in the Violet-headed Sun-bird of Africa, is regularly graduated, and we have the form continued in several species from Continental India, where it prevails, and also exists in a more developed manner in some lovely birds sent to us from Nipaul by Mr. Hodgson, and which we shall immediately describe and figure from his specimens; but in doing this, let it be distinctly understood that we do so with no wish to interfere with his discoveries; and we cannot help expressing our regret to see that gentleman daily deprived of the merit of his extensive researches in ornithology by the arrival of insulated specimens, when we know that for some years large remittances collected by him, containing hundreds of new species, have continued hidden in the keeping of his friends. In some of these Indian species the centre feathers become much more elongated, and seem to lead

to the next form of tail, where that member is perfect in itself, the lengthened feathers being rather accessaries, appearing only during incubation and disappearing with the moult of the rainy season, or winter.



Those with the elongated tail-feathers will be represented by our next figure of



MALACHITE SUN-BIRD.

Nectarinia famosa.

PLATE XVII.

THE largest species of Sun-bird which is known, and when in its full breeding plumage, a bird of great splendour. In this form we have ten feathers in the tail, short, and nearly of equal length; the centre or sixth pair being narrow and alone much lengthened, in the specimen before us exceeding the other feathers by three inches and a quarter. This is what the French writers term "*Queue en flèche;* and in some of the smaller species the length beyond the short feathers is even still more disproportioned. The Malachite Sun-bird has been frequently figured, both on account of its being very early known, and from the splendour of its colours, though perhaps few figures have or ever will come up to the varying tints and changes which play upon its plumage. An adult male now before us is nine inches in extreme length, of which the bill measures an inch and a quarter, the excess of the centre tail-feathers being as we mentioned above. The whole upper and under parts are of a deep Malachite green, having a play of golden green and reddish bronze, particularly on the head



NECTARINIA FAMOSA.
Cape of Good Hope.

and neck, with the forehead and throat in some lights appearing deep black. The feathers on the latter parts are thick and close like the pile of velvet, in which they resemble the structure of the same parts in the Paradise-birds, and which is not frequently met with in the Sun or Humming-birds. We may remark, that in some specimens we have seen a pinkish bronze tint prevailing over nearly the whole upper plumage, but Le Vaillant observes, in his description, that this bronze colour is caused by the stuffs used in preparing the skins, and that in a fresh state it does not appear. This we have had no opportnnity of verifying. On the back and breast the colours have often the appearance of being waved, from the tips only of the feathers being of the brilliant green, the base being deep black, over which the others lie and partially exhibit the dark tint beneath. The wings and tail are black, the secondaries and covers of



the former being edged with green and violet; the latter distinctly margined for two-thirds of their length with the malachite green of the upper parts. From each axilla there springs a lengthened tuft

of gamboge-yellow plumes. Bill and legs are black. This plumage, together with the lengthened tail-feathers, is lost immediately after the season of incubation, when it becomes nearly of a uniform dull oil-green, yellowish on the throat, paler on the under parts (and described by Le Vaillant as yellowish, which characterises the adult from the young male in the first moult); the centre feathers of the tail coming in of an equal length with the others. The female is described to be considerably less in size, and to be entirely of an olive-brown colour, the outer feathers of the tail being bordered with white.

This species is abundant in the vicinity of the Cape of Good Hope, or at least was so in the days of Le Vaillant, remaining stationary during the year, frequenting the gardens, and there extracting the juices from the flowers. It extends also along the eastern coast, and the author above quoted states that fifty may be found in a day by remaining quiet within reach of one of their favourite plants, to which they constantly flock. The nest is composed of slender twigs covered externally with moss. The eggs are four or five in number, and are of a greenish colour.



NECTARINIA PULCHELLA.
Native of Senegal.

RED-BREASTED SUN-BIRD.

Nectarinia pulchella, LINNÆUS.

PLATE XVIII.

LE VAILLANT gives Senegal as the country of this Sun-bird, stating that it is also found in Southern Africa, but not beyond the "Great River" in the Caffre country, where it frequents the forests; Mr. Swainson, in his Birds of Western Africa above quoted, remarks that it "seems to be particularly common in Senegal, from whence great numbers have been recently sent to Europe as articles of commerce;" and we have ourselves received specimens which appear identical, and which have supplied the accompanying figure and description, from the vicinity of Sierra Leone. The adult male is both above and below of a rich golden-green, upon the crown, throat, and breast seeming more intense from the structure of the feathers. The centre of the breast is crossed by a bright collar of yellowish carmine red, shading off upon the belly into gamboge-yellow, and there running to a point along the centre; the vent, wings, and tail are black, under tail-coverts tipped with shining bluish green; the centre tail-feathers or long coverts are black, edged at the base with the green of the upper parts.

Extreme length to end of the long feathers, six inches two tenths, to the end of true tail, four inches two tenths. In a specimen accompanying that now described, and which we consider to be a male changing from its brilliant dress, the two centre feathers of the tail are worn nearly to their shafts, in the same way that we often perceive those of the Scolopacidæ after the season of incubation, and previous to their having entirely thrown off that dress. The upper parts are entirely of a hair-brown, a few bright green feathers remaining apparent on the crown and rump. The wings are brownish black, shining green upon the shoulders, and the entire under parts are yellowish white, the yellow tint being deeper along the centre of the breast and belly. In both states the bill and legs are black.



NECTARINIA PLATURA.
Native of S. Africa.

PURPLE-RUMPED LONG-TAILED SUN-BIRD.

Nectarinia platura, VIEILLOT.

PLATE XIX.

LE VAILLANT, in describing this bird, seems to have felt that it was an aberrant form, and from the resemblance of the bill to that of the warblers, gave it the appellation of "*Figuier*," and it also varies from the previously noticed birds in minute size of the first quill, as represented in the wood-cut at the end of this description; he only found it in the forests of the country of the Namaquois, where it gained its subsistence chiefly from the flowers of a species of scentless jessamine, which grew in abundance under the mimosas; little farther is known regarding it, and the nest was not found. Our own specimens were received from Southern Africa, but without any accompanying information. The total length of a male, apparently in complete plumage, is six inches and eight tenths; the bill to the forehead, four tenths; the long caudal feathers surpassing the tail by two inches six tenths. The upper parts, above the rump, are green, with bronze and slight purple reflections; the rump and tail-coverts violet purple; the throat, fore part of the neck, and upper parts of the breast, duck green, with metallic reflec-

tions; the remaining under parts, saffron-yellow; the wings are brownish black; the tail black; the centre long feathers glossed with steel-blue, and somewhat spatulate at the tips. The female is described by Le Vaillant as above of a reddish grey tinted with olive, and as wanting the long feathers; the belly and under parts, however, continuing yellow.

We also have specimens of a Sun-bird from the vicinity of Sierra Leone, possesing a similar distribution of markings and of the same size, but the tints are somewhat different. The whole upper parts, together with the throat and breast, are of a rich bronzed purple, showing very little indication of green in any light, and having the violet of the rump scarcely distinguishable from the other plumage; the yellow under parts are of a decidedly deeper tint, approaching almost to gallstone-yellow; the true tail is perfectly square, whereas, in the first described, we have thought it slightly graduated. These, however, we consider here as merely local variations. Another closely allied bird is the



BLUE-RUMPED LONG-TAILED SUN-BIRD.

Nectarinia metallica, LICHTENSTEIN.

OF this species, closely allied to the last, there are figures of both sexes in the *Planche Coloriècs*, and in the Atlas to Rüppell's "*Reise in Nördlichen Afrika.*" In form and general distribution of colouring, this bird nearly resembles the last, but the lower parts of the back upper tail-covers, and tail, are of a bright metallic blue. The dark colour of the throat and fore part of the neck also is bordered with a distinct collar of clear blue, wanting in the species we have previously figured. Cretzschmar, in Rüppell's Atlas, describes the female as grey (hair brown) on the upper part of the body; the wings, and also the tail dark, with a light border; the two outer feathers having white tips. The whole lower parts of the body pale lemon-yellow, paler on the chin, throat, and under tail-covers.

Nubia and the vicinity of Dongala are the localities given to it by Temminck. Cretzschmar, on the authority of Rüppel, states that it is found in all North-eastern Africa, south of Suckot, nestling in the acacia trees.

We come next to examine the species of India and her islands; they extend generally over the continent, reaching to a very high elevation among the Himalayas, while they are also found on the Malay peninsula and the vast archipelago of the East Indian islands. The forms resolve themselves almost into two,—those having the tail square, and those having that member more or less graduated. Of the first, the birds show a smaller, thickset, and more compact form than the African square-tailed species; they have generally a coronal and gular patch; the under parts are frequently banded with one or more distinct colours, and they possess yellow or orange axillary tufts; their distribution seems to be chiefly, but not exclusively, the plains or Lower Continental India, and the islands. The second, possesses brilliant colouring, often a coronal patch, but instead of that on the throat, we have lines or stripes of resplendent feathers on the sides of the maxilla, and reaching down on the neck, the centre tail-feathers often extend beyond a proportional graduation. These seem to be most frequent in Alpine India, Nipaul, &c.

We have found considerable difficulty in making out these correctly. An idea has been taken up that they are subject to considerable variety, which seems scarcely to be the case, many species being closely allied, yet at the same time, when in adult plumage, pretty constantly and regularly marked.



NECTARINIA ZEYLONICA.
Native of India.

CEYLON YELLOW-BELLIED SUN-BIRD.

Nectarinia Zeylonica, LINNÆUS.

PLATE XX.

THE *Certhia Zeylonica* of Linnæus, sent by Governor Loten from Ceylon, refers to the bird we have now represented; but the synonym of that illustrious naturalist is erroneous, and, though printed by him with a ?, it has been continued to many of the descriptions which have since been given of the bird, and has kept up the confusion; in our Synopsis will be found what we consider as belonging to it.

We have received the males from various parts of Continental India, where it seems pretty generally distributed and far from uncommon; but we have never seen specimens from any of the East Indian islands, nor been able to compare those of the continent with a Ceylonese bird. Dr. Latham, on the authority of Dr. Buchanan, states that "it is found in all the gardens near Calcutta, lives by sucking honey out of flowers, and will readily sip sugar and water." "The nest, suspended from the extreme branch of a tree, is almost of a globular shape, with a neck above somewhat like an alembic, and composed of fine fibres, with a round hole of entrance on one side, nearer the bottom than the middle." Mr. Jerdon, who described it under the

name of *C. sola*, says it is " more abundant in the Carnatic than in any other part of the peninsula, and to be seen in almost every garden.

The length of our specimens are about four inches and a quarter. The crown of the head, above the eyes, extending to the occiput, is a dark and deep olive with green and purple reflections; the chin, throat, and fore parts of the neck, rich violet or amethystine purple, changing with the light; these form the coronal and gular patches of scale-like feathers. The sides of the neck, back, scapulars, and a band across the upper parts of the breast, of a rich purplish brown (maroon red); the lesser wing-covers similar in tint to the head, but having a greater tinge of purple; lower parts of the back and upper tail-covers rich amethystine purple; wings umber-brown, edges of the feathers paler; tail nearly black, the exterior feathers with very pale greyish tips, on the outer one extending for nearly a quarter of an inch; the breast and belly king's-yellow, becoming paler on the flanks and under tail-covers.

Mr. Jerdon, who is an accurate observer, thus describes the female, " olive-green above, beneath yellow, chin and throat white, wings and tail as in the male."

In the collection of Hugh Strickland, Esq. there are specimens apparently a variety of this species, having the coronal patch violet, the gular patch nearly steel-blue, agreeing somewhat with that placed by Dr. Latham as his Var. 1.

NECTARINIA SOLARIS, Temminck.

Of the same form and distribution of colouring with the last, is the species figured in the *Planches Coloriées*, pl. 347, fig. 3, under the title of "*Souimanga souci, N. solaris.*" It is from Amboina, one of the Molucca islands. From the figure above quoted, the following description is drawn:—The coronal patch covering the whole crown green; the gular patch extending over the throat, sides of the neck, and breast is violet-purple; the upper parts olive, wings and tail brown, the latter (in the description) having the two lateral feathers tipped with white; the belly, vent, and flanks, orange-yellow; the axillary tufts paler.

SCARLET-BELLIED SUN-BIRD.

Nectarinia affinis, SHAW.

PLATE XX.

THE specimen from which the drawing of our plate was made agrees with the figure and description of the bird represented by Temminck as the "*Souimanga à ventre écerlate*," with the "*Souimanga à gorge violette*" of the *Ois. dor.*, and with Dr. Latham's *C. sperata*, var. B.; but it differs from the "*Certhia philippensis purpurea*" of Brisson, from which all the descriptions of the *Certhia sperata*, Linnæus, are taken, in the green colour of the coronal patch and lower back, with the upper tail-covers; by Brisson, these parts are said to be violet. Brisson's bird was from the Philippine Islands, and so also is Temminck's specimen; and it may remain a question whether there is some mistake in the description of Brisson, handed down through a variety of volumes, or that there are two distinct and closely allied birds, the one with the coronal patch and tail-coverts *violet*, as in Brisson's bird, or with these parts *green*, as in Sonnerat and Temminck's specimens.

This very beautiful species has the whole crown, running to the hind-head, green, with golden reflec-



NECTARINIA AFFINIS.

Native of Manilla.

tions; the cheeks and auriculars black; sides of the neck, nape, mantle, and greater covers, rich purplish red (maroon); lesser covers and bend of the wing green, similar to the coronal patch; the lower part of the back and upper tail-covers, rich metallic olive-green with purple reflections; wings umber-brown, edges of the feathers paler; tail black, outer webs of the feathers edged with violet; underneath the chin, throat, and fore part of the neck are amethystine purple; lower part of the breast and belly scarlet; vent and under tail-covers oil-green.

In this species, and one or two allied, there is a small patch of brilliant feathers upon the sides of the breast where the gular patch terminates; in the present bird they are of a rich bluish green. Entire length from four to four and a quarter inches. There are no axillary tufts.

Temminck's specimens were received from Manilla; we do not know the locality of that which has served for our plate.

VON HASSELT'S SUN-BIRD.

Nectarinia Hasseltii, TEMMINCK. *

PLATE XXII.

THIS species is indicated in Sir Stamford Raffle's catalogue in the Linnean Society's Transactions for 1812, under the title and as a variety of "*Certhia sperata*;" it is not, however, any of the states to which that name has been applied; and in modern times, at least, Temminck separated and recognised it as a distinct species.

The specimen which we have figured and described, has the whole crown extending a short way upon the nape of a brillant golden green; the feathers of a short and soft texture, and not appearing imbricated; the cheeks, sides, back of the neck, wings, and tail, are of a deep velvet black; the mantle, lower back, and tail-covers, with the lesser wing-covers and bend, of a metallic olive-green or steel-blue, varied according to the lights. Underneath, the chin is nearly black, bordered on each side with a maxillary stripe, and shading downwards

* This bird is *Certhia Brasiliana violacea* of Brisson; *Certhia Brasiliana*, Shaw. We have retained Temminck's specific name as preferable to *Brasiliana*, though the latter was given much prior to it.



NECTARINIA HASSELTII.
Native of Java.

into amethystine purple which forms the patch on the fore part of the neck and breast; on each side of this we find the small spots of brilliant feathers alluded to in the description of the last, and here of a steel-blue colour. No true axillary tufts. The lower parts of the breast and belly are of a purplish red (maroon); the vent and under tail-covers greyish black. The entire length scarcely four inches. Java is the only authentic country given for this species; Temminck received it from thence; our own specimens were purchased among some birds from the East Indian islands.

Another bird, having the same character in the markings with this, we find figured in the *Voyage du Coquille*, from New Guinea, apparently of the typical structure; but, from its locality, ranging on the verge of the Australian geographic separation, where we find representing forms of somewhat different appearance and colouring.

NECTARINIA ASPASIA, Lesson.

Cheeks, sides of the neck, mantle, wings (wings in text "*sont brunes*"), lower part of the belly and vent, deep velvet-black; coronal patch emerald-green, passing over the occiput to the nape; the wing-covers, lower back, and upper tail-covers, golden green; tail black, feathers edged with blue; while the chin, throat, and fore part of the neck is occupied with a patch of deep bluish violet.

GENERAL LOTEN'S SUN-BIRD.

Nectarinia Lotenia, LINNÆUS.

PLATE XXIII.

THIS bird is one of the Nectariniadæ first and originally described by Linnæus in the *Syst. Naturæ*, from specimens sent to him by General Loten, Governor of Ceylon, and named in honour of that gentleman, "*qui hortum botanicum primus in India condidit, et tot raris avibus me aliosque dotavit.*" From the improper synonymes of Gmelin being applied to the description, the original name has been long given to another and very different bird (*N. splendida*, Shaw, Plate V.), and we think it only due, both to its discoverer and first describer, to restore its former title. We have not seen specimens either from Ceylon or any of the East Indian Islands, all those which we have received being from various parts of Continental India. Mr. Jerdon states it to be tolerably common in the Carnatic and on the west coasts of the peninsula, frequenting both gardens and jungles. Specimens of the male before us are in entire length five inches; that of the bill to the forehead, which is considerably hooked, showing a difference when compared with the same member in the next, one inch. The



NECTARINIA LOTENIA.
Native of India.

whole of the upper parts, cheeks, sides of the neck, and lesser wing-covers, are of a dark metallic-green with blue and purple reflections; the wings umber-brown; tail bluish black, feathers edged with green. On the under parts, the chin is velvet-black, the neck and upper part of the breast dark metallic-green, shading at the lower edge of this gular patch into rich steel-blue tinted with violet; this is succeeded by a narrow band of purplish red, the remaining under parts being of a dark yellowish hair-brown, relieved upon the sides by two ample axillary tufts of king's-yellow. In some specimens the prevalence of the varying colour is different. Mr. Jerdon's birds have a greater shade of purple above, and the margin of the gular patch is nearly steel-blue. Mr. Jerdon describes the female as—"Above light greenish-brown, quills darker, tail black; beneath pale yellow; only differs from the female of the last (our next bird) in the darker tint of the plumage above."

MAHRATTA SUN-BIRD.

Nectarinia Mahrattensis, LATHAM.

PLATE XXIV.

THE species which we have placed under the above name we have received from the plains of India, the more alpine districts, by the attention of Captain Alexander Singers, from Nipaul, through Mr. Hodgson, and, as Mr. Jerdon remarks of it, "it appears to be the most generally distributed of all the Cinnyridæ, and is the only one I have met with on the bare table land." Notwithstanding this apparent frequency, and that it is not an uncommon bird in Indian collections, the descriptions of authors are so very short, that it is with difficulty that by them it can be separated from some allied birds. From the following description also, it will be seen how near it agrees with the last bird, differing, however, by the more purple tint of the upper plumage, the black belly and vent, the orange as well as yellow axillary tufts, and by the form and proportions of the bill.

The entire length is from four inches seven-tenths to four and a half; bill to the forehead seven, or seven-tenths and a half. The upper parts and lesser



NECTARINIA MAHRATTENSIS.
Native of India.

wing-covers are steel-blue varied with green or purple, and in some specimens having a violet tinge entirely prevailing; wings brownish black; tail black feathers edged with steel-blue. The cheeks, chin, neck, and upper part of the breast, are of the same steel-blue with the upper parts, sometimes inclining to greenish or to violet, but on the chin the feathers are darker, almost black, and the fore part of the neck is of a deeper and more violet tint in some lights, showing a decided central mark running downwards for the whole length of the gular patch. The remaining under parts are black, having the feathers of the under tail-covers edged with steel-blue; but the black is separated from the gular patch by a narrow band of purplish red, in some specimens scarcely perceptible. The axillary tufts are king's-yellow, overlaid by a few plumes of brilliant orange-red.

Mr. Jerdon describes the female as "above, greenish brown-grey; beneath, pale yellow; darkest on the throat; tail black; quills dusky."

Colonel Sykes has stated this bird to be South African as well as Indian, on the comparison of specimens from both countries.*

* Proceed. Zool. Soc., 1835, p. iii. page 62.

MINUTE SUN-BIRD.

Nectarinia minuta, SYKES.

VIGNETTE TITLE.

A LOVELY species of Sun-bird was characterised by Colonel Sykes in his Catalogue of the Birds of the Deccan, under the above name; specimens were also met with by Jerdon on the Indian peninsula, a pair of which were forwarded for our examination, and these we have been unable to reconcile to any previous description. They were met with by the latter naturalist in the high forest-jungle of Malabar; by Colonel Sykes "only in the dense woods of the Ghauts. White ants and the larvæ of flies were found in their stomach."

The entire length of Mr. Jerdon's specimens is about three inches six-tenths (he states three inches and three-quarters). Above, the crown and nape are brilliant olive with purple reflections, and of a soft scutellated appearance; the upper plumage, including the lesser wing-covers, are very rich purplish red with a large mixture of scarlet, on the lower back and upper tail-covers varying with pale bluish purple. The wings are umber-brown, the tail dark blackish brown. Beneath, the throat and

upper part of the breast rich amethystine purple, forming the gular patch; the remaining under parts deep primrose-yellow.

In the female, above, there is no coronal patch; the head, neck, and mantle, yellowish oil-green; the lesser covers, lower back, and upper tail-covers are of the same colour as in the male, but with a slighter tinge of the varying bluish purple; the wings and tail umber-brown; the lower parts entirely dark primrose-yellow, deepest on the throat and breast: the bill, legs, and feet seem to have been wood-brown.

PECTORAL OR DARK-BREASTED SUN-BIRD.

Nectarinia pectoralis, HORSFIELD.

PLATE XXV. FIG. 1.

WE have specimens of this species from the collection of the London Zoological Society, furnished to them by the East India Company, and procured from Java; we give it, therefore, as identical with the bird described by Dr. Horsfield, and that figured by Temminck in the *Planches Coloriès;* it is also very near to the *Certhia Philippensis olivacea* of Brisson, and the *Grimpereau olive des Philippines* of Buffon, *Planches Enluminées*, but in neither the description of the one, nor the figure of the others, is the frontal patch of steel-blue indicated.

The entire length of the specimen before us is within a tenth of four inches; that of the bill to the forehead seven-tenths. Above, the plumage is dark yellowish oil-green, on the forehead a patch of steel-blue, extending backwards to a line with the exterior angle of the eye, and with a narrow streak of the rich colour passing over each; wings umber-brown, feathers edged with yellow oil-green; tail black, somewhat graduated,—the feathers, except the centre ones, tipped with white, on the outer to the extent of nearly half the feather. Underneath,

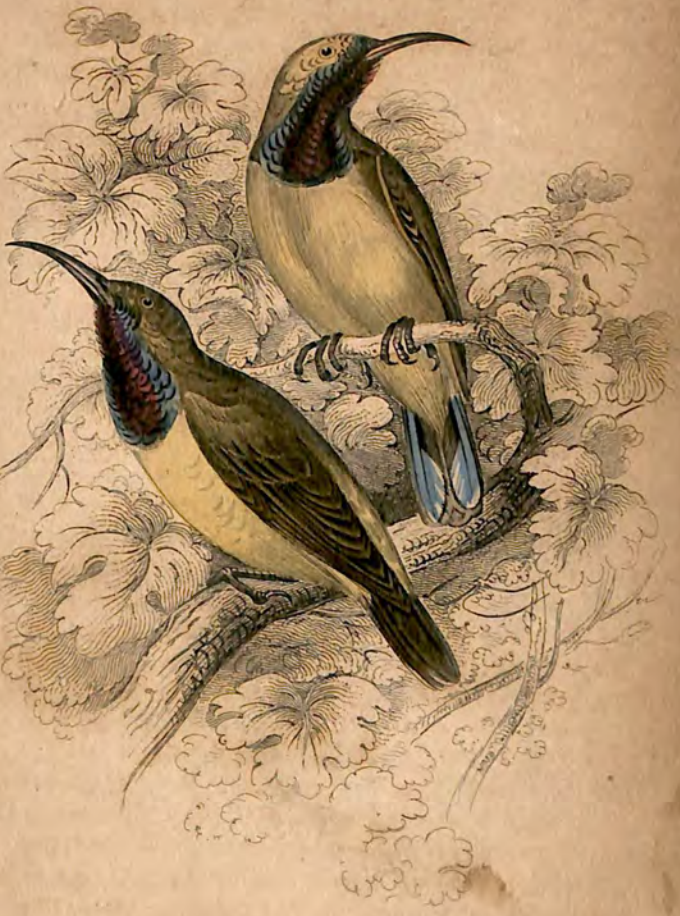
the chin, throat, and breast are of the deep steel-blue which forms the pectoral adornment whence the species has been named, the chin being very dark, and along the centre of the throat and neck being of a decidedly purple tint, and showing a defined longitudinal band. The remaining under parts are king's-yellow, slightly paler towards the vent; the axillary tufts of a deeper shade. Horsfield states that the female is distinguished by the want of the dark colour on the breast; and by Temminck she is represented as of a hair-brown above, the under parts greyish white, with a slight trace of yellow in the centre of the belly. Bill black, tarsi and feet dark blackish brown.

DARK-THROATED SUN-BIRD.

Nectarinia jugularis, VIEILLOT.

PLATE XXV. FIG. 2.

UPON the same plate with the last, we give a figure of an allied species, brought from the Philippine Islands by Mr. Cumming, which we refer to the "*Certhia Philippensis minor*" of Brisson, and to the *N. jugularis* of Vieillot; that gentleman, quoting Brisson's synonim, considers it only as an immature bird. Many of Brisson's specimens were from the Philippine Islands, and have been confounded we fear with allied birds from Continental India and the Javanese and Sumatran group, without proper examination. The bird before us does not seem to show any marks of immaturity, and whether we are right or not in our references, we have little doubt of its being a distinct species; birds from the Philippine Islands have of late not been very readily procured, and we shall feel obliged to any of our friends if they will allow us to examine any they possess. In length Mr. Cumming's specimen equals that of the last, and its general proportions are very similar. Above, the plumage is a yellowish hair-brown, with a greenish



NECTARINIA PECTORALIS, N. JUGULARIS.

Natives of Java & Phillipine Islands.

tint in some lights, and having that colour predominating on the lower parts of the back; the wings darker, inclining to umber-brown; the tail black, and with the same distribution of white on the tips of the feathers as in *N. pectoralis*. Underneath, the chin, throat, and upper part of the breast are deep steel-blue, appearing intensely dark in the centre. This dark colour does not extend so far down as in the last, but at the side there are a few dark brown feathers, indicating a narrow terminal band of that colour; the remaining under parts are dull king's yellow, paler towards the vent; the axillary tufts ample, and deep king's yellow; bill, tarsi, and feet black.

Our next plates will represent a series of rich coloured birds, having the tail either much graduated, or with the centre feathers disproportionally exceeding the graduation, as to appear somewhat like the corresponding species in Africa. These appear to be most frequent in Northern and Alpine India, the Himalaya range, Nipaul, &c., and may be represented by the

GOALPARAH SUN-BIRD.

Nectarinia Goalpariensis, ROYLE.

PLATE XXVI.

THE bird we have now represented was received from Nipaul from Mr. Hodgson, and appears identical with the Goulparah Creeper of Latham and the *Cinnyris Vigorsii* of Colonel Sykes, although there are slight discrepancies in both these descriptions; in the first there is no mention made of the pale yellow rump and brilliant tail-covers, both of which seem to afford a constant and marked feature for the distinction of some species; the yellow on the rump may, however, have readily escaped notice, as from the structure of the plumage on that part it may be at times entirely concealed. The feathers upon the sides of the lower part of the back are of a loose downy texture, and are so long as to be capable of being raised over, and of completely covering not only the yellow patch but part of the tail-covers, and so completely as to require separation before the pale colour can be discovered. In Colonel Sykes' bird we have the maxillary stripe and "*macula auriculari, splendenti violaceis;*" the latter is awanting in our Nipaul specimen.



NECTARINIA GOALPARIENSIS.

Native of Nipaul.

The length of our Nipaul specimen is about five inches four-tenths; of the bill to the forehead, seven and a half tenths; that of the long tail-feathers, about two and six-tenths, exceeding the other about eight tenths. The bill, legs, and feet are wood-brown, the latter very pale on the mandible; the crown golden-green with slight purple reflections, changing its intensity with the light; the nape, back, and scapulars deep carmine red, with a brownish or subdued tinge, separating them from the colour of the cheeks, throat, and breast, which are of a clear and dazzling scarlet, relieved on each side of the maxilla with a moustache or streak of rich violet purple. The rump is banded with pale king's-yellow, but immediately below the red on the back the feathers, of an oil-green colour, are lengthened, and can be made to conceal entirely the yellow band, which we have no doubt they do while the bird continues in a state of rest. The wings are umber-brown, having the feathers edged with oil-green; the vent and under tail-covers are pale clove-brown or greyish white. The tail itself is brownish black, with the upper covers and two centre feathers deep green, with reflections; the two centre feathers are much lengthened, and are of disunited texture.

This species does not appear to be very uncommon; we have seen several specimens of it, and its range is also somewhat wide; as stated, we possess it from Nipaul. Professor Royle figures it from Deyra Doon as an example of a tropical form from

Northern India, and represents the nest as pendulous. Dr. Latham's specimen was shot at Goalparah, and if we are correct in referring it to Colonel Sykes' bird, it was found in the dense forests of the Ghauts, feeding on the larvæ of flies, and on spiders, ants, and minute insects.

DR. LATHAM'S SUN-BIRD.

Nectarinia Lathami, JARDINE.

WE possess a specimen of a Sun-bird from some part of Continental India, closely allied to that we have now represented, and also to the *Certhia Siparaja* of Sir Stamford Raffles' catalogue. From the Goalparah Sun-bird it differs in a slight general modification of the tints of the plumage, in the yellow of the rump being much deeper, and in the coronal patch, upper tail-covers, and tail being steel-blue instead of metallic-green, and in the tail being shorter and more regularly graduated. Sir Stamford's bird is from Sumatra; no mention is made of the yellow rump, while, in the catalogue appended to that gentleman's Memoirs, *N. mysticales*, Temm. from Java is quoted. A comparison of the birds may serve to distinguish them. The entire length is four inches four-tenths; that of the bill to the forehead, six-tenths. Above, the forehead to the line of the eyes is steel-blue, with a play of colour; the upper tail-covers and edges of the tail-feathers, except the outer, are of the same tint, and the tail itself, nearly black, has a very strong gloss of bluish purple; the back and sides of the neck, cheeks, back, and lesser wing-covers, are rich

brownish red. The lower part of the back and rump are very deep gamboge-yellow, almost Dutch orange, and following the red of the back we have the same lengthened plumes we saw in the last, of a dark greyish oil-green, and which can completely cover the yellow patch; the wings are umber-brown feathers edged with a paler tint and oil-green. Underneath, we have the maxillary stripes running upon the sides of the neck, inside half of the feathers black, the exterior rich violet; the chin, fore part of the neck, and breast, bright scarlet-red; the remaining under parts dull greyish oil-green. Bill umber-brown, slightly paler on the maxilla.

As stated, we do not know the locality of the specimen we have described, and in the collection of the Zoological Society there is one similar, and bearing out the distinctions from *N. Goalpariensis* we have pointed out, but the locality of which is also unknown.

SIPARAJA SUN-BIRD.

Nectarinia Siparaja, RAFFLES.

THIS is characterised in the descriptive catalogue in the Transactions of the Linnean Society for 1822, and in the subsequent catalogue in the Appendix to Sir Stamford Raffles' Memoirs, *N. mysticalis*, Temm. is quoted as a synonim. The discrepancy in the description of the former, and figure of the latter, is, in the first, "abdomen brown;" in the figure, these parts are pure white. From our last species, the Rafflesian bird differs in having no yellow on the rump, and Temminck's figure varies both in the want of that and in the white under parts. The *N. Siparaja* is from Java and Sumatra, and it is probable may be distinct from the continental birds; the union of the other two will rest on the authority of the catalogue in the Memoirs. "This species has a blue patch on the forehead, and a stripe of the same colour on each side of the neck. The back of the head, neck, and upper parts of the back, are dark red; the breast of a lighter red; the abdomen, wings and middle tail-feathers brown, while the tail-covers and outer tail-feathers are blue*." Temminck's figure is represented with the whole tail blue, and the belly and vent pure white.

* Trans. Linn. Soc., xiii. p. 299.

NIPAUL SUN-BIRD.

Nectarinia Nipalensis, HODGSON.

PLATE XXVII.

THE subject of our present plate is one of the fine species formerly alluded to as received from Mr. Hodgson. When examining the specimens in the collection of the Zoological Society, we found one similar to it, marked as above, and sent to the Society by that gentleman; we have therefore retained the name, though it may be equally applicable to several others. It agrees very nearly with that which has served for our illustration, the yellow on the rump being followed by a very deep greenish black band, which separates it from the brilliant tail-covers, and these appearing more tufted than usual.

In the bird before us the entire length is five inches and a half, of which the long central tail-feathers measure almost three inches. The head, throat, and neck, are deep steel-blue on the upper part of the back; a broad crescented band of deep and rich reddish chestnut, extending on each side upon the breast, and pointing upwards on the sides of the neck; the centre of the back and shoulders,



NECTARINIA NIPALENSIS.

Native of Nipaul.

with the edges of the quills and secondaries, are olive, or of a clear oil-green, the rump gamboge-yellow, the upper tail-coverts deep steel-blue; the quills and secondaries are blackish blue, paler on the inner webs; the tail, graduated and having the feathers rather accuminated towards the tips, is black, the centre feathers being nearly entirely greenish steel-blue, those on the outsides edged with that colour. The under parts are gamboge-yellow, in the centre of the breast and belly bright reddish orange; the insides of the wings are pale yellowish white.

MRS. GOULD'S SUN-BIRD.

Nectarinia Gouldiæ, VIGORS.

BELONGING to the same group, in form and colouring, is the beautiful species which will now stand as the Ornithologist's record of an accomplished artist. The *N. Gouldiæ* was dedicated to Mrs. Gould by the friend of her husband, at a time when she had shown how much could be effected by the union of taste and skill with a fine mechanical invention, and had produced a series of ornithological figures which could vie with the best that had preceded them, and were excelled only by those which appeared in her later works.

"The top of the head, ear-coverts, throat, a spot on each side of the chest near the shoulder, tail-coverts, and two middle tail-feathers, are of a rich metallic-blue with brilliant purple reflections; the back and sides of the neck and shoulders are deep sanguineous red; the rump and under surface bright yellow, the latter having a few sanguineous dashes; the quills and outer tail-feathers dark brown." The above is the description given by Mr. Gould of this beautiful species, from a specimen at the time considered unique. On examining that specimen in the collection of the Zoological Society of London,

we noticed that the coronal patch extends backwards to the hind head in a pointed form; the upper parts described as sanguineous are rather of a deep chestnut-red having carmine mixed with it; the quills and coverts deep oil-green; the tail is nearly black, except the centre feathers, which are elongated, and of the same steel-blue on the edges as that seen on the tail-coverts.

HODGSON'S SUN-BIRD.

Nectarinia Hodgsonis, JARDINE.

PLATE XXVIII.

We have provisionally named this fine species after the individual who has done so much towards the elucidation of the Zoology of Nipaul, although he may himself have already applied a specific appellation to it in some of the scattered periodicals where he has detailed his discoveries. We possess only a single specimen, which is unfortunately somewhat mutilated; at the same time, we believe our figure and description will be found to be tolerably correct.

The extreme length, to the tips of the longest tail-feathers, five inches and a half; the length of the long feathers being about three. The crown and nape of the neck, with two narrow stripes or lengthened moustaches running from the base of the maxilla upon the sides of the neck, are of a very rich steel-blue, with violet purple and pink reflections. The lower part of the rump, upper tail-coverts, and centre tail-feathers, are of the same beautiful colours, the latter being broadened at their base, disconnected in their webs, and extended disproportionately be-



NECTARINIA HODGSONIS

Native of Nipaul.

yond the rest of the tail. The upper parts of the back, sides of the neck, and scapulars, are of a dark reddish chestnut, inclining to blood-red; the centre of the back appears to be deep black, and there is a trace of the pale yellow band on the rump which prevails through this group; the wings are brownish black. On the under surface of the bird* the chin and throat, the fore parts of the neck between the two stripes, and entire breast, are very deep black; the vent and under tail-coverts are greenish grey; the sides and under surface of the wings pale yellowish white; bill and legs are nearly black.

* In these parts the specimen is considerably mutilated.

RED-TAILED SUN-BIRD.

Nectarinia phœnicura.

PLATE XXIX.

We have another large and fine tailed species entrusted to us by the Zoological Society. The male has the long centre feathers imperfectly developed, but entirely exclusive of them is five inches in length. The female is within an eight of seven inches to the extremity, while her tail measures three and a half inches. In the male, the crown and two broad maxillary stripes are steel-blue with violet reflections; the hind-head, back, and sides of the neck, rump and upper tail-covers, and outside webs of the tail-feathers, bright orange scarlet-red; the rump, dull gamboge-yellow; the shoulders, scapulars, and edges of the wing-feathers, oil-green; the quills and secondaries, and inner webs of the tail-feathers, umber-brown; the chin and centre of the throat and neck, deep velvet-black. The remaining under parts gamboge-yellow, orange in the centre of the breast, and becoming very dull and greenish on the vent and tail-coverts. In the female the whole upper parts and wings, rump excepted, are yellowish oil-green; on the rump the yellow band is marked by dull yellow, and suc-



NECTARINIA PHŒNICURA.

Native of Silhet.

ceeding it the upper covers and tail are of the same scarlet or wax-red with the male, the long feathers having a black shaft and disunited webs. The chin, fore part of the neck, and breast, are pale oil-green, of a greyish tint, and the remaining under parts are dull gamboge-yellow, darkest and clearest in the centre of the breast and belly.

The above described specimens are from Silhet, and were presented by Sir Philip Egerton, Bart. to the Society.

EBOE SUN-BIRD.

Nectarinia Eboensis, THOMPSON.

PLATE XXX.

WE have received, by the attention of Mr. Thompson, one of the surgeons to the Niger expedition, but too late for bringing into its proper place, both sexes of a very remarkable Sun-bird, procured in the vicinity of Eboe; it will range with those having the colouring and markings of *N. fulginosa*, *Stangerii*, &c. but varies from them, as well as from other species, by the throat and breast, or the parts occupied generally by the coloured gular or pectoral patch, being of a dull straw-yellow, forming a very decided contrast with the otherwise dark plumage. In size the male is slightly less than *N. Stangerii*, being in length about four inches and eight-tenths. Above, the plumage is of a uniform yellowish umber-brown, slightly darker on the wings and tail; the coronal patch passes the line of the eyes, and is of a deep green. Underneath the chin is velvet black, bordered by a maxillary stripe of deep green, the fore parts of the neck and upper breast straw-yellow bordered on the lower edge by dark umber-brown; the lower breast, belly and sides, are pale chestnut-brown; under tail-covers



NECTARINIA ADELBERTI.
Native of W. Africa.

dark umber-brown. The female, slightly less, is above uniformly of a dark hair-brown, nearly approaching to umber-brown on the wings and tail. The lower plumage of the body is pale yellowish grey, each feather darker along the centre; the bill, legs, and feet, are here dark umber-brown, whereas in the other sex, they are black. These specimens are deposited in the British Museum.

SYNOPSIS.

Genus NECTARINIA, Illiger.

Nectarinia, Illiger, 1811 < Certhia, Linnæus = Mellisuga, Vieillot, 1816 = Cinnyris, Cuvier, 1817.*

Gen. Characters.—Bill slender, curved, very fine and acute at the tip, dilated at the base, edges of the maxilla folding over the mandible, mandible narrow in depth at the base, edges of both minutely and regularly denticulated; tongue lengthened, slender, with a shortly bifid fringed apex, the edges for the whole length turned over inwards, forming a double tube; wings, with the third quill longest, first short, nearly spurious; tail even, lengthened and much graduated, or with the two centre feathers only elongated; tarsi and feet fully developed, the hallux lengthened and with its claw proportionally strong. Types, *N. famosa*, *chalybea*, *amethystina*, *lotenia*

Note. India and Africa, principally within the tropics. Colours of the plumage brilliant; often with metallic lustre.

SPECIES WHICH HAVE BEEN EXAMINED.

N. afra, Linnæus, 1766.

Certhia afra, Linn. Syst. Nat. i. p. 186, 1766†; Gm. Linn. i. p. 476 (syn. exc.); Lath. Ind. Orn. i. p. 286 (syn. exc.); Shaw, Gen. Zool. viii. p. 192 (syn. exc.).—*Cinnyris smaragdinus*, Vieill. Enc. Method. Orn. p. 595

* We here use the signs proposed by Mr. Strickland:—< less than, = equal to, > greater than.

† Edit. 12 is quoted throughout.

1823.—*Sucrier à plastron rouge*, Le Vaill. Ois. d'Afr. vi. p. 176, pl. 300, M. & F.—*Blue-rumped Creeper*, Lath. Gen. Hist. iv. p. 239 (syn. exc).

♂ *Above*, head, back, rump, less. w.-covers, deep golden-green with a bronzed lustre; up. t.-covers steel-blue, wings umber-brown, tail black.—*Below*, chin black; throat, fore part of the neck, and upper breast, golden-green, the latter at the lower edge shaded into violet and steel-blue, forming a pectoral band not passing the line of the wings; lower breast and ant. half of the belly deep scarlet-red; post. half of belly, vent, flanks, and und. t.-covers, yellowish wood-brown; axillary tufts pale king's-yellow; bill, tarsi, and feet, black.—Length 5½ in. to 5 in. 4-10ths; bill to forehead, 1 in.; w. to longest quill, 2 in. 7-10ths.

♀ *Above*, hair-brown, darker on the wings and tail,—outer web of the outer feather of the latter, white.—*Below*, wax-yellow (feathers pale hair-brown at the base), shading into yellowish-white on the vent and und. t.-covers; bill, tarsi, and feet, dark umber-brown; proportions equal to ♂.

Hab. S. Africa. The forests of the E. coast to Caffraria on the Gamtoo and Sondag rivers. Does not reach the S. extremity of the continent, but is restricted to the line of the great forests. *Le Vaill.—Note.* In the descript. in the Syst. Nat. it is "*abdomine albo.*"

N. CHALYBEA, Linnæus, 1766.

Certhia chalybea, Linn. Syst. Nat. i. p. 186 (syn. exc.); Gm. Linn. i. p. 475 (syn. exc.); Lath. Ind. Orn. i. p. 284 (syn. exc.).—*Certhia torquata C. B. Spei. Le grimpereau a collier du C. de B. Esperance*, Briss. Ornithol. 4to. iii. p. 643, pl. xxxii. fig. 1; 8vo. ii. p. 13 (syn. of last exc.).—*Grimpereau du C. de B. Esperance*, Buff. Pl. Enl. 246, fig. 3.—*Cinnyris chalybea*, Sw. Zool. Illust. pl. 95.—*Collared Creeper*, Lath. Gen. Hist. iv. p. 247 (syn. exc.).—*Chalybean Creeper*, Shaw and Nodd., Nat. Miscel. x. pl. 381.—*Red-collared Sunbird*, Sw. B. of W. Afr. ii. p. 132. (The last may be found to belong to the next.)

♂ *Above*, head, neck, back, less. w.-covers, and rump, golden-green; up. t.-covers violet steel-blue; wings umber-brown; tail blackish brown, outer feather hair-brown edged with greyish white.—*Below*, chin, throat, and breast, golden-green, terminated by a narrow band of steel-blue, running beyond the line of the wings upon the sides of the neck; lower breast and ant. half of the belly scarlet-red; post. half of the belly, vent, flanks, and und. t.-covers, pale brocoli-brown; bill, tarsi, and feet, black. Length, from 4¼ in. to 4 in. 8-10ths; of bill to forehead, 7 to 8-10ths; of wing to long. quill, 2 in. 2-10ths to 2 in. 3-10ths.

♀ *Above*, entirely brocoli-brown, darker on the wings and tail. —*Below*, much paler, on the vent and und. t.-covers nearly yellowish white; bill, tarsi, and feet, dark umber-brown.—Length, 4½ in.

Hab. S. Africa to the extremity of the Cape peninsula, *Le Vaill.* Western Africa, *Sw.*—*Note.* Differs from *N. afra* in its smaller proportions, different tint of the lower parts, blue collar stretching on the sides of the neck, and different colour of the female.

N. CHLOROPYGIA, Jardine, 1842.

N. chloropygia, Jard. Ann. of Nat. Hist. vol. x. p. 188; Illust. of Orn. N. S. pl. L., 1842.—*Green-rumped Double-collared Sun-bird*, Nat. Lib. Nect. p. 172, pl. iii..

♂ *Above*, rich emerald bronzed green; w. and t. brownish black, former with the edges of the feathers oil-green, latter glossed with green.—*Below*, chin velvet-black; throat, neck, and breast emerald-green, terminated by a narrow band of bluish green; lower breast with a band of scarlet-red; belly, flanks, and under t.-covers, pale oil-green; axillary tufts ample, king's-yellow; bill, tarsi, and feet, black.—Length, 4 in. 4-10ths; bill to forehead, 7-10ths; w. to longest quill, 1 in. 9-10ths.

♀ *Above*, oil-green; w. and t. umber-brown.—*Below*, chin yellowish-white; breast and flanks wine-yellow, shading to pale but pure gamboge-yellow in the middle of the belly; bill, tarsi, and feet, dark umber-brown.—Length, 3 in. 8-10ths; w. to longest quill, 1 in. 8-10ths.

Hab. Fernando Po, Niger Exped., *L. Fraser.* *—*Note.* Differs from *N. chalybea* in lesser size, want of blue on the up. t.-covers, and blue pectoral collar; tint of under parts; in difference of female.

N. BIFASCIATA, Shaw, 1811.

Souimanga vert et brun, Vieill. Ois. Dor. ii. pl. 24.—*Cinnyris nitens*, Vieill. Enc. Method. Ornith. ii. p. 588, 1823. —*Certhia bifasciata*, Shaw, Gen. Zool. viii. p. 198, 1811. —*Violet-breasted Creeper*, Lath. Gen. Hist. iv. p. 248.

♂ *Above*, head, neck, back, less. w.-covers, rich bronzed green, on the rump and t.-covers, shading to emerald-green (feathers black at the base); w. and t. black glossed with green, feathers of the latter purple on the edges.—*Below*, chin, throat, and fore part of the neck, brilliant bronzed green, shading into a pectoral band of rich steel-blue, succeeded by a second distinct band, changing from dull red to vermillion; belly, vent, and und. t.-covers black, on the latter and at the termination of the second pect. band tipped with steel-blue; bill, tarsi, and feet, black.—Length, 5 in. 3-10ths; bill to forehead, 9-10ths; w. to long. quill, 2 in. 8-10ths.

Hab. Interior of S. Africa, *Smith.* Malemba, *Vieill.*—*Note.* First quill short, compared with other sp. of similar size.

N. SPLENDIDA, Shaw, 1811.

Certhia splendida, Shaw, Gen. Zool. viii. p. 191, 1811.—*Cinnyris splendida*, Cuv. Reg. Anim. i. p. 434, 1817; Swain. West. Africa, ii. p. 125.—*Cinnyris splendidus*, Vieill. Enc. Method. ii. p. 587, 1823.—*Cinnyris bombycinus*, Vieill. Enc. Method. ii. p. 596, 1823.—*Le Sucrier eblouissant*, Le Vaill. Ois. d'Af. vi. pl. 295, fig. 1, p. 163. *Le Souimanga à Plumes Soyeuses*, Vieill. Ois. Dor. ii. pl. 82. — *Blue-rumped Creeper*, var. C., Lath. Gen. Hist. iv. p. 240.

♂ *Above*, head steel-blue, in some lights appearing black, in others as rich violet; back of the neck, back, up. t.-covers

* Naturalist to the Niger Expedition.

shoulders, and less. w.-covers, brilliant golden-green, feathers black at the base ; w. and t. black, feathers of the latter edged with golden green.—*Below*, throat and fore part of the neck steel-blue (changing as upon the head) ; across the breast a band of scarlet, according to position appearing as if banded with steel-blue, golden-green, or violet, or to be composed entirely of one of tnese tints ; lower breast, belly, and flanks, deep black ; under t.-covers steel-blue ; axillary tufts primrose-yellow ; bill, tarsi, and feet, black.—Length, 5½ in. ; of bill to forehead 9-10ths ; of w. to long quill, 3 in. 8-10ths.

Hab. Great Namaqua country, towards Fish river, *Le Vaill.* Sierra Leone, coll. from *Dr. Fergusson.* Cape Coast, Niger Exped. *L. Fraser.*—*Note.* Plumage with the webs of the feathers loose and unconnected ; up. t.-covers nearly as long as the tail.

N. COLLARIS, Vieillot (Enc. Method.), 1823.

Cinnyris collaris, Vieill. Enc. Method. ii. p. 590, 1823 ; Dict. Classique d'Hist. Nat. xv. p. 510, 1829.—*Le Sucrier Gamtocin, ou à cordon blue*, Le Vaill. Ois. d'Af. pl. 299, M. and F.

♂ *Above*, bright yellowish green ; w. umber-brown, feathers broadly edged with yellowish green, quills with oil-green ; t. greenish black, broadly edged with deep green.—*Below*, chin, throat, and up. breast, yellowish green, shading into and terminating in a narrow band of blue glossed with violet ; lower breast and flanks wax-yellow, shaded to gamboge-yellow on the centre, vent, and und. t.-covers ; axillary tufts pale king's-yellow ; bill, legs, and feet, black.—Length, 4 in. 2-10ths to 3 in. 8-10ths ; of bill to forehead 4½-10ths. ; of w. to long. quill, 2 in. to 1 in. 8-10ths.

♀ *Above*, nearly as in ♂ ; cheeks and sides of the neck, dull yellowish green.—*Below*, chin yellowish white ; breast and flanks wax-yellow, shading into dull gamboge-yellow in the centre of the belly, the vent, and und. t.-covers ; bill, tarsi, and feet, brownish black. Length, 3 in. 8-10ths.

Hab. Gamtoos, *Le Vaill.* S. Africa, coll. *Dr. Smith.* Fernando Po, Niger Exped. *L. Fraser.*

N. VENUSTA, Shaw and Nodder, 1790.

Certhia venusta, Leona Creeper, Shaw and Nodd. Nat. Hist. Misc. x. pl. 369.—*Leona Creeper*, Lath. Gen. Hist. iv. p. 234.—*Cinn. venusta*, Vieill. Enc. Method. ii. p. 597 (spec. char. only).—*Cinn. pusilla*, Swain. Birds of West. Afr. ii. p. 138, 1837.

♂ *Above*, forehead violet; back and sides of the neck, less. w.-covers, back, and rump, bronzed green; up. t.-covers steel-blue; w. clove-brown, edged with oil-green; tail black, feathers edged with green.—*Below*, chin black; fore part of the neck green, terminating in a distinct band of violet, succeeded on the sides by dull black, losing itself in the centre of the violet band, and forming an angular patch on each side of the breast; lower breast, belly, and vent, pale king's-yellow, paler on the und. t.-covers; axillary tufts orange-yellow; bill, tarsi, and feet, black.—Length, 3 in. 3-10ths to 3½ in.; bill to forehead, 6-10ths; w. to long. quill, 2 in. 1-10th.

Hab. Western Africa, *Swain.* Sierra Leone, *Shaw & Nodd.* —*Note.* Differs from the last in the general tint, frontal and pectoral violet bands, orange axillary tufts.

N. FUSCA, Vieillot, 1823.

Cinnyris fuscus, Vieill. Enc. Method. ii. p. 594, 1823.—*Sucrier Namaquois, ou à caleçons blanc*, Le Vaill. Ois. d'Af. pl. 296, M. & F.

♂ *Above*, base of the plumage purplish brown, tips of the feathers purple with greenish reflections; w. dark clove-brown; up. t.-covers black, with steel-blue reflections; t. black.—*Below*, chin dull black, fore part of the neck and breast purplish brown with purple and green reflections, shading into blackish brown on the sides and upper part of the belly, again running into white on the vent, flanks, and und. t.-covers; axillary tufts orange-red; bill, tarsi, and feet, dark brownish black.—Length, 4¼ in. to 4 in. 8-10ths; of bill to forehead, 8-10ths; of w. to lower quill, 2 in. 3-10ths.

Hab. Great Namaqua, *Le Vaill.* Mouth of the Orange River, *Dr. Smith, MSS.*

N. VERROXII, Smith, 1831.

Cinnyris Verroxii, Smith, South African Quart. Journ. No. V. p. 13; Illust. of the Zool. of S. Afr., No. XI. Aves. pl. 57, M. and F.

♂ *Above*, head, neck, less. w.-covers, and back, dark bluish olive with metallic lustre (interrupted by the dark base of the feathers appearing); lower part of the back, rump, up. t.-covers, w. and t., clove-brown, darkest on the t. and with a slight purple reflection.—*Below*, pale hair-brown tinted with yellow, on the sides and flanks shaded to brocoli-brown; axillary tufts scarlet-red; bill, tarsi, and feet, blackish brown.—Length, 5 in. 6-10ths; of bill to forehead, 9½-10ths; of w. to long. quill, 4 in. 6-10ths.

♀ *Above*, uniform brocoli-brown, darker on the w. and t. —*Below*, pale brocoli-brown, tinted with greenish-yellow, on the flanks and vent yellowish grey; bill, tarsi, and feet, umber-brown.—Length, 5 in. 1 or 2-10ths.

Hab. Kafir Land and eastward, towards Port Natal, *Dr. Smith.*

N. OBSCURUS, Jardine, 1842.

♂ *Above*, yellowish olive, darker on the crown, and having a more yellow tint on the lower back and rump; w. and t. umber-brown, feathers edged with yellow oil-green; t. underneath appearing dark, the outer feathers tipped with greenish grey.—*Below*, whole under surface wine-yellow; axillary tufts gamboge-yellow; bill, tarsi, and legs umber-brown,—first with the base of the mandible pale.—Length, 5 in. 2-10ths; of bill to forehead, 9-10ths; of w. to long. quill, 2 in. 7-10ths.

♀ *Above*, similar to ♂.—*Below*, greyish wine-yellow; bill, tarsi, and feet, pale umber-brown.—Length, 4 in. 9-10ths; of bill to forehead, 8-10ths; of long. quill, 2 in. 3-10ths.

Hab. Fernando Po, Niger Exped. *L. Fraser.*

N. OLIVACEUS, Dr. Smith, 183—.

Cinnyris olivaceus, Smith, Illust. of the Zool. of S. Afr. in Descrip. of *C. verroxii.*

♂ *Above*, dark olive, on the crown nearly bluish black; w.

and t. dark umber-brown, feathers edged with yellowish olive, t. with the out. feathers tipped with grey.—*Below*, oil-green, paler on the vent and und. t.-covers, on the throat tinted with yellow; axillary tufts pale saffron-yellow; bill, tarsi, and feet, umber-brown.—Length, 6 in.; of bill to forehead, 1 in.; of w. to long. quill, 2 in. 6-10ths.

Hab. Vicinity of Port Natal, *Dr. Smith*, *MSS.*—*Note*, differs from the last in larger size, darker colour above, difference of the tint below.

N. CUPREA, Shaw, 1811.

Certhia cuprea, Shaw, Zool. viii. p. 201, 1811.—*Souimanga tricolor*, Vieill. Ois. Dor. pl. 23.—*Cinnyris tricolor*, Vieill. Enc. Method. Orn. p. 588.—*Cinn. erythronotus*, Swain. West. Af. ii. pl. 15, 1837.—*Certhia rubrofusca*, Shaw, Zool. viii. p. 222, 1811?—*Le Souimanga rougedore*, Vieill. Ois. Dor. pl. xxvii.?—*Cinnyris nibarus*, Vieill. Enc. Method. Orn. p. 597, 1823?

♂ *Above*, crown, cheeks, back, and sides of the neck, reddish purple with a bronzed and coppery lustre; lower back, rump, and up. t.-covers, auricula-purple; w. and t. black, tinted with blue; less. w.-covers violet-purple.—*Below*, chin, fore part of the neck, and breast, reddish purple, the latter prevailing; lower breast, belly, vent, and t.-covers, deep black; bill, tarsi, and feet, black.—Length, 4 in. 8-10ths; of bill to forehead, 7-10ths; of w. to long. quill, 2 in. 8-10ths.

♀ *Above*, plumage, including the w., dark brownish oil-green, darkest on the latter; t. nearly black, outer feathers tipped with grey.—*Below*, pale wax-yellow, clearest and more yellow in the centre of the belly.—Length, 4 in. 3-10ths; bill to forehead, 6-10ths.

Hab. Cape Coast. Accra, Niger Exped. *L. Fraser.* Malemba, as *N. tricolor*, Vieill. Senegal, as *N. erythronotus*, Swain.

N. CYANOCEPHALA, Shaw, 1811.

Certhia cyanocephala, Shaw, Zool. viii. p. 203, 1811.—*Souimanga à tête blue*, *N. cyanocephalus*, Vieill. Ois. d'Or. ii. pl. 7; Enc. Method. Orn. p. 587.—*Cinnyris chloronotus*,

Swain. West. Afr. ii. pl. 16. p. 136.—*Souimanga vert et gris*, Vieill. Ois. Dor. ii. pl. xxv. Female.

♂ *Above*, crown, nape, cheeks, and sides of the neck, dark bluish green with metallic lustre, base of the feathers black; back, rump, up. t.-covers, and less. w.-covers, clear yellowish oil-green without lustre; w. and t. pale umber-brown, feathers edged with yellowish oil-green. *Below*, chin, fore part of the neck, and breast, dark bluish green with steel-blue reflections; belly, flanks, vent, and und. t.-covers, uniform brocoli-brown; axillary tufts primrose-yellow; bill, tarsi, and feet, black.—Length, 5 in. 3-10ths. to 5¼; of bill to forehead, 9-10ths; of wing to long. quill, 2 in. 6-10ths.

♀ *Above*, as in ♂.—*Below*, uniform greyish white, paler on the vent, and there tinted with yellowish oil-green; length, 5 in. 5-10ths; of bill to forehead, 8-10ths; of w. to long. quill, 2 in. 4-10ths.

Hab. Malemba, *Vieill.* Sierra Leone *Dr. Fergusson.*

N. Senegalensis, Linnæus, 1766.

Certhia Senegalensis, Linn. Syst. Nat. edit. xii. p. 186, 1766; Lath. Ind. Orn. i. 284, 1790.—*Grimpereau violet du Senegal, Certhia Senegalensis violacea*, Briss. Ornithol. 4to. p. 660, pl. xxxlv. fig. 2; 8vo. vol. ii. p. 18, 1763.—*Cinnyris discolor*, Vieill. Enc. Method. Orn. p. 589, 1823.—*Le Sucrier protée*, Le Vaill. iv. pl. 295, fig. 2.—*Le Souimanga violet à poitrine rouge*, Vieill. Ois. Dor. pl. viii. — *Cinnyris Senegalensis*, Swain. West. Af. ii. p. 127, 1837.

♂ *Above*, coronal patch above the eyes, as far as the occiput, rich emerald-green; lores black; remaining plumage deep brownish black, glossed with purple, paler on the wings, feeling to the touch like velvet.—*Below*, maxillary stripe broad, emerald-green, chin and throat golden-green; fore part of the neck and breast scarlet-red, varying to violet-blue, each feather being tipped with the former, succeeded by a band of the latter; belly, vent, and und. t.-covers, deep brownish black; bill, tarsi,

and feet black.—Length 5 in. 4-10ths to 5; of bill to forehead, 8-10ths; of w. to long. quill, 2 in. 6-10ths.

Hab. Caffraria, *Le Vaill.* Senegal, *Swain.*

N. NATALENSIS, Jardine, 1842.

♂ *Above*, coronal patch, confined to the crown, bluish green; bend of the w. violet; remaining plumage deep brownish black, paler on the w. and t., feeling to the touch like velvet. — *Below*, maxillary stripe narrow, bluish-green, chin and throat golden-green; fore part of the neck and breast scarlet-red, intermixed with violet, each feather being broadly tipped with the former, succeeded by a band of the latter; belly, vent, and und. t.-covers, deep brownish black; bill, tarsi, and feet, black.—Length, 5 in. 9-10ths; bill to forehead, 2 in. ½-10th; w. to long. quill, 3 in. 1-10th.

Hab. Vicinity of Port Natal.

N. AMETHYSTINA, Shaw, 1811.

Certhia amethystina, Shaw, Zool. viii. p. 195, 1811.—*Cinnyris amethystina*, Cuv. Reg. Anim. 1816.—*Cinnyris auratifrons*, Vieill. Enc. Method. Orn. p. 590, 1823.—*Le Sucrier velour*, Le Vaill. Ois. d'Af. vi. pl. 294.—*Le Souimanga à front d'oré*, Vieill. Ois. Dor. pls. v. vi.

♂ *Above*, coronal patch, confined to the crown, dark emerald-green; bend of the w. and up. t.-covers, amethystine-purple; remaining plumage very deep brownish black, with a play of purple, feeling to the touch like velvet.—*Below*, gular patch on the chin, throat, and fore part of the neck, amethystine-purple; breast, belly, vent, and und. t.-covers, brownish black; bill, tarsi, and feet, black.—Length, 5 in. 3-10ths to 5 in. 9-10ths; of bill to forehead, 1 in. 1-10th to 1 in. 2-10ths; of w. to long. quill, 2 in. 8-10ths to 3 in.

N. FULIGINOSA, Shaw, 1811.

Certhia fuliginosa, Shaw, Zool. viii. p. 223, 1811.—*Cinnyris fuliginosus*, Vieill. Enc. Method. Orn. p. 584, 1823.—*Souimanga carmélite*, Vieill. Ois. d'Or. pl. xx.—*Soui*

manga carmélite cinnyris fuliginosus, Drapiez, Dict. Class. d'Hist. Nat. xv. p. 510.—*Carmelite Creeper*, Lath. Gen. Hist. iv. p. 256.

♂ *Above*, uniform pale yellowish umber-brown; w. and t. dark umber-brown, with slight purplish reflections; forehead with an imbricated patch extending to the line of the eyes; less. w.-covers and radial edge of the w., auricula-purple; axillary tufts bright primrose-yellow.—*Below*, yellowish umber-brown; chin, throat, and fore part of the neck, auricula-purple.—Length, 5 in.; of bill to forehead, 7-10ths; w. to long. quill, 2½ in.

Hab. Malemba, western coast of Africa, *Vieill.*

N. STANGERI, Jardine, 1842.

N. Stangeri, Jard. Ann. of Nat. Hist. x. p. 187, 1842.—*N. Stangeri, Niger Carmelite Sun-bird*, Nat. Lib. Nect. p. 198; Jard. and Selby, Illust. of Orn. N. S. pl. xlviii.

Above, uniform deep yellowish umber-brown, darker on the w. and t., showing yellowish lights; coronal patch, reaching to the line of the eyes, imbricated, deep green, posterior row of feathers violet.—*Below*, dark umber-brown, with purple lights; chin velvet-black; gular patch yellowish green, bordered by a maxillary stripe of deep green, extends to the upper part of the breast, and has the last row of feathers deep steel-blue tipped with scarlet, appearing like a terminating scarlet thread; bill, tarsi, and feet, black.—Length, 5 in.; bill to forehead, 7½-10ths; wing to long. quill, 2 in. 6-10ths.

Hab. Niger.—*Note.* Only specimen in possession of Mr. Waterhouse, procured by Dr. Stanger. Differs from preceding in colour of coronal and gular patches; no colour on lesser w.-covers; want of axillary tufts.

N. ADELBERTI, Gervais, 1834.

Cinnyris Eboensis, Thompson, MSS., M. 141, F. 140.—*Souimanga d'Adelbert, Cinnyris Adelberti*, Gervais, Mag. de Zool. iii. pl. 2.—*Nectarinia Adelberti*, Nat. Lib. vol. xxxvi. pl. iii. p. 244; Jard. and Selby, Illust. of Orn., N. S., pl. 49, M. and F.

♂ *Above*, uniform yellowish umber-brown, slightly darker on the w. and t.; coronal patch passing the line of the eyes, imbricated, deep green.—*Below*, chin velvet-black, bordered by a maxillary stripe of deep green; fore part of the neck and upper breast straw-yellow, bordered on the lower edge by dark umber-brown; lower breast, belly, and sides, pale chestnut-brown; und. t.-covers dark umber-brown; bill, tarsi, and feet, black.—Length, 4 in. 8-10ths; bill to forehead, 7-10ths; w. to long. quill, 2 in. 4-10ths.

♀ *Above*, dark hair-brown, on the quills and t. nearly umber-brown.—*Underneath*, pale yellowish grey, clearest in the middle of the belly; the feathers darker along the centre of each; bill, legs, and tarsi, dark umber brown.—Length, 4 in. 6-10ths.

Hab. Senegal, *Gervais.* Eboe on the Niger, *Thompson.*

N. VIOLACEA, Linnæus, 1766.

Certhia longicauda minor C. B. Spec. Briss. Ornithol. iii. p. 649, pl. xxxiii. fig. 6; 8vo. ii. p. 15, 1763.—*Certhia violacea*, Linn. Syst. Nat. i. p. 188, 1766; Linn. Mantissa, p. 525, 1771; Lath. Ind. Orn. i. p. 288, 1790.—*Le Souimanga à capuchon violet*, "*C. violaceus*," Vieill. Enc. Method. p. 598.—*Le Sucrier oranga*, Le Vaill. vi. p. 152, pl. 292.

♂ *Above*, crown, back and sides of the neck, upper part of the back, and bend of the w., dark golden-green, varied with bronze and purple; back, rump, up. t.-covers, edges of the feathers of the w. and t., yellowish green; w. and t. pale umber-brown.—*Below*, chin and throat dark golden-green; centre of the breast, and nearly bordering the green of the sides as a narrow crescent, violet purple; lower part and centre of the breast and belly, deep reddish orange, shading into gamboge-yellow on the flanks and und. t.-covers; axillary tufts pale king's-yellow; bill, tarsi, and feet, black.—Length, 6 in.; of bill to forehead, 9-10ths; of w. to long. quill, 2 in. 2-10ths.

Hab. Vicinity of Cape of Good Hope, *Le Vaill.*—*Note.* Center t.-feathers exceed the others by 9-10ths or 1 in.; t. graduated.

N. FAMOSA, Linnæus, 1766.

Certhia famosa, Linn. Syst. Nat. i. p. 187, 1766.—*Certhia longicauda, C. B. Spec.* Briss. Ornithol. 4to. iii. p. 647, pl. xxxiv. fig. 1 ; 8vo. ii. p. 14.—*Souimanga Malachite, C. famosus*, Vieill. Enc. Method. p. 592.—*Le Sucrier Malachite*, Le Vaill. Ois. d'Afr. p. 143, pls. 289, 299.—*Le grande Souimanga a longue queue*, Vieill. Ois. Dor. pls. xxxvii., xxxviii.—*Famous Creeper*, Lath. Gen. Hist. iv. p. 214.—*Shining Creeper, C. famosa*, Shaw, Gen. Zool. viii. p. 212, pl. 31.—*Grimpereau a longue queue du C. de B. esperance*, Buff. Pl. Enl. 83, fig. 1.

♂ *Above*, including less. w.-covers and scapulars, malachite-green, on the head and neck with a play of green and reddish bronze; w. black, on the secondaries tinted with violet; t. square, centre feathers much elongated, black, the latter at their base edged with malachite-green.—*Below*, chin in some lights appearing black; throat and neck generally of a golden bronzed green; breast, belly, and vent, malachite green, on the latter and und. t.-covers intermixed with black; axillary tufts gamboge-yellow; bill, tarsi, and feet, black.—Length, 9 in. to 9½ in.; of bill to forehead, 1 in. 3-10ths; of w. to long. quill, 3 in. 2-10ths; long. t.-feathers exceed the square t. from 2½ in. to 3 in. 1-10th.

Hab. S. Africa, vicinity of the C. of G. Hope, *Le Vaill., &c.*

L. PULCHELLA, Linnæus, 1766.

Certhia pulchella, Linn. Syst. Nat. i. p. 187, 1766; Gm. Linn. p. 481.—*Certhia longicauda Senegalensis*, Briss. Ornithol. 4to. iii. p. 645, pl. xxxiv. fig. 3; 8vo. ii. p. 14. *Le Sucrier cossu*, Le Vaill. Ois. d'Afr. vi. p. 154, pl. 293, fig. 1.—*Cinnyris caudatus*, Vieill. Enc. Method. p. 595, 1823.—*Grimpereau a longue queue du Sénégal*, Buff. Pl. Enl. 670; auct. Le Vaill.—*Beautiful Creeper*, Lath. Gen. Hist. iv. p. 217.—*Le petit Souimanga a longue queue*, Vieill. Ois. Dor. pl. 40; Swain. Birds of W. Africa.

♂ *Above*, including less. w.-covers and edges of the w. to base of 1st quill, golden-green; w. brownish black; tail, square centre-feathers only elongated, black,—the latter at their base

edged with green.—*Below*, throat, fore part of neck, and upper breast, intense emerald-green; lower breast with a collar of yellowish carmine-red, shading upon the belly into gamboge-yellow, and running to a point along the centre; sides of the belly golden-green; flanks, vent, and und. t.-covers, black,—the latter tipped with bluish-green; bill, tarsi, and feet, black. Length, 6 in. 2-10ths; of bill to forehead, 6-10ths; of long. quill, 2 in. 3-10ths; long. t.-feathers exceed the square tail 2-10ths.

Hab. S. Africa, but not within the Great River in the Kafir country. Senegal, *Le Vaill., Sw.* Sierra Leone, *Dr. W. Fergusson.*

N. PLATURA, Vieillot, 1823.

Le Souimanga figuier, Cin. platurus, Vieill. Enc. Meth. Orn. p. 589, 1823.—*Le Sucrier figuier*, Le Vaill. Ois. d'Afr. vi. p. 157, pl. 293.—*The Saccharine Creeper*, Lath. Gen. Hist. iv. p. 225.—*Nect. sylviella*, Temm. Pl. Col. Note to pl. 347, and Ind.

♂ *Above*, head, neck, back, scapulars, and w.-covers green with bronze and purple lustre; rump and t.-covers, violet-purple; w. brownish black; tail square, centre feathers only elongated, black,—the latter broadly edged with violet-purple, at the tips slightly spatulate.—*Below*, throat, fore part of neck and upper breast, duck-green; lower breast, belly, vent, and und. t-covers, saffron-yellow; bill, tarsi, and feet, black.—Length, 6¼ in.; of bill to forehead, 4-10ths; of w. to long. quill, 2 in. 2 or 3-10ths; long. feathers exceed the square tail 2 in. 6 or 7-10ths.

Hab. Forests of the Great Namaquois, *Le Vaill.* Sierra Leone, *Dr. W. Fergusson.*—*Note.* Specimens vary in the proportion of the purple reflection on the upper plumage, and in the depth of the yellow below. Those from W. Africa show greatest degree of purple and deeper yellow.

N. METALLICA, Lichtenstein, 18—.

Nectarinia metallica, Schilleruder Honigsauger, Cretz. Rupp. At. zu der Reise in Nörd. Af. Vog. 10. Taf. 7, 1826; Hemp. & Ehrenb. Symb. Phys. av. pl. 1.—*Souimanga metallique, N. metallica*, Temm. Pl. Col. 347, figs. 1, 2.

♂ *Above*, head, neck, back and less. w.-covers, blackish green, with purple lustre; rump and up. t.-covers steel-blue; w. brownish black; t. nearly square, centre feathers only elongated, black,—the latter narrowly edged with violet, slightly spatulate at the tips.—*Below*, throat, fore part of the neck, and upper breast, blackish green, bordered with a distinct collar of clear blue; lower breast, belly, and vent, pale king's-yellow; und. t.-covers yellowish white, tipped with yellow; bill, tarsi, and feet, black.—Length, 6 in.; of bill to forehead, 4-10ths; of w. to long. quill, 2 in. 1-10th; long feathers exceed the square tail 2 in.

Hab. N. E. Africa, south of Suchet, *Rüppell.* Southern Arabia, Dongola, Abyssinia, *Ehrenb.* Nubia, Dongola, *Temm.*

N. ZEYLONICA, Linnæus, 1766.

Certhia zeylonica, Linn. Syst. Nat. i. p. 188 (syn. exc.); Gm. Syst. i. p. 482 (syn. exc.); Lath. Ind. Orn. i. p. 285 (syn. exc.)—*Ceylonese Creeper*, Lath. Gen. Hist. iv. p. 227 (syn. exc.)—*Cinnyris sola*, Jerd. in Madras Journ. ii. p. 128.—*Souimanga a ceinture maroon*, Vieill. Ois. Dor. p. 37, pl. xvi. (syn. exc.).

♂ *Above*, crown extending to the occiput, deep olive-green, with green and purple reflections; less. w.-covers similar, with a much greater tint of purple; checks and auriculars, deep umber-brown; back and sides of the neck, back, and scapulars, purplish brown; lower back and up. t.-covers, amethystine-purple; w. umber-brown, edges of the feathers paler; t. nearly black, exterior feathers tipped with grey, on the outer for a third of its length.—*Below*, chin, throat, and fore part of the neck, amethystine purple, the breast crossed by a bar of purplish red, continued from the brown colour of the upper parts; lower breast and belly king's-yellow, shaded to a paler tint on the flanks, vent, and und. t.-covers; bill, tarsi, and feet, dark brownish black.—Length, 4 in. to 4 in. 2-10ths; of bill to forehead, 6-10ths; of w. to long. quill, 2 in. 2-10ths.

Hab. Ceylon, *Linn.* Continental India. Carnatic, more than any other part of the peninsula, *Jerd.*—*Note.* Varies in the degree of purple on the coronal patch; gular patch steel-blue;

spec. in coll. of H. Strickland, Esq.; in breadth of purplish red pectoral band.

N. AFFINIS, Shaw, 1811.

Souimanga a gorge violette, Vieill. Ois. Dor. pl. 32.—*Red-breasted Creeper*, var. B., Lath. Gen. Hist. iv. p. 221.—*Certhia sperata*, var. γ, Lath. Ind. Orn. i. p. 283 (syn. exc.).—*Souimanga à ventre écarlate, N. coccingaster*, Temm. Pl. Col. 388, fig. 3.—*Certhia affinis, Violet-throated Creeper*, Shaw, Gen. Zool. viii. p. 208, 1811.

♂ *Above*, crown, extending to the occiput, green with golden reflections; cheeks and auriculars black; back and sides of the neck, back, and gr. covers, dark purplish red; lower back and upp. t.-covers olive green with purple reflections; w. umber-brown, edges of the feathers paler, bend green; tail black, out. edges of the feathers violet.—*Below*, chin, throat, and fore part of the neck, amethystine-purple; lower breast and belly scarlet; small patch of metallic-green feathers where the pectoral patch terminates; vent and und. t.-covers oil-green; bill, tarsi, and feet, dark umber-brown, base of the mandible pale. —Length, about 4 in.; of bill to forehead, 6½-10ths; of w. to long. quill, 2 in. 1-10th.

Hab. Manilla, *Temm.*—*Note.* The true *C. sperata*, Linn. (*Certhia Philippensis purpurea*, Briss.) seems to differ from Temminck's bird in having the head, throat, and upper part of the neck "*splendidissimè violaceæ*;" and in the lesser w.-covers, lower back, rump, and up. t.-covers "*violacea, splendidè viridi colore variantes.*" "Violet" can only be applied to the gular patch of *N. affinis*, brilliant green with slight purple reflections being the colour of the other parts. We suspect that this is a variety, and that it should stand as *N. sperata*, Linn. with its synonims.

N. HASSELTII, Temminck, 18—.

Souimanga de Hasselt, N. Hasseltii, Temm. Pl. Col. 376, fig. 3.—*Certhia sperata*, Sir St. Raffles, Trans. Linn. Soc. xiii. p. 298, 1822.—*Certhia Braziliensis violacea*, Briss. Ornithol. 4to. iii. p. 662, pl. xxxii. fig. 4; 8vo. ii.

p. 19.—*Black and Violet Creeper*, Lath. Gen. Hist. iv. p. 274.—*Le Souimanga violet*, Vieill. Ois. Dor. p. 65.—*Certhia Brasiliana*, Shaw, Gen. Zool. viii. p. 257.

♂ *Above*, the crown, extending upon the occiput and nape, golden-green (feathers of a soft and disunited texture); cheeks, sides, and back of the neck, w., and t., deep black; mantle, lower back, up. t.-covers, less. w.-covers, metallic olive-green varied with steel-blue and purple.—*Below*, chin nearly black, bordered by a maxillary stripe, which with the neck and breast is amethystine-purple; on each side of the pectoral patch a small spot of steel-blue; lower breast and belly purplish red; vent and und. t.-covers greyish black; bill, tarsi, and feet, black.—Length, 3 in. 8-10ths; of bill to forehead, 6-10ths; of w. to long. quill, 2 in.

Hab. Java, *Temm.*

N. CALCOSTETHA, Jardine, 1842.

♂ *Above*, crown, extending backwards upon the nape, dark emerald-green; less. w.-covers, lower back, rump, and up. t.-covers, metallic olive-green with purple reflections; w. blackish brown, great. w.-covers edged with violet; checks, sides of the neck, back, and t. black, feathers of the latter edged with steel-blue.—*Below*, chin black; maxillary stripes amethystine-purple; fore part of the neck and breast copper-red (black when not held in the light); lower breast and belly violet-purple at the sides surrounding the colour of the breast, and nearly joining on each side with the maxillary stripes; lower belly, vent, and und. t.-covers, greyish-black; axillary tufts deep king's-yellow; bill, tarsi, and feet black.—Length, 3 in. 6-10ths; of bill to forehead, 6¼-10ths; of w. to long. quill, 2 in. 2-10ths.

Hab. E. Ind. Islands?—*Note.* Nearly allied to *N. aspasia*, Less.; differing from the figure and description by distinction of colours on the breast, greyish black vent, and the presence of yellow axillary tufts. (See description of that sp. in Pl. II.)

N. LOTENIA, Linnæus, 1766.

Certhia lotenia, Linn. Syst. Nat., p. 188 (syn. exc.), 1766;

Gmel. Linn. i. 483 (syn. exc.).—*Certhia polita*, Lath. Ind. Orn. i. p. 287, 1790.—*Polished Creeper*, Lath. Gen. Hist. iv. p. 245.—*Le Souimanga pourpre*, Vieill. Ois. Dor. ii. pl. xi.—*Purple Indian Creeper*, Edw. Glean. ii. pl. 265, up. figure.—*Cinnyris purpurata*, Vieill. Enc. Method. p. 596, 1823; *Cinnyris polita*, Jerd. Madras Journ. 1840, p. 127.—*Purple Creeper*, *Certh. purpurata*, Shaw, Gen. Zool. viii. p. 201.

♂ *Above*, dark metallic-green, with blue and purple reflections; w. umber-brown; tail bluish black, feathers edged with green.—*Below*, chin velvet-black; neck and upper parts of the breast dark metallic-green, shading at the lower edge into steel-blue, sometimes tinted with violet, lower breast with a narrow band of purplish red; belly, vent, and und. t.-covers, yellowish hair-brown; axillary tufts ample, king's-yellow; bill strong at the base, considerably curved, with the tarsi and feet black.—Length, 5 in.; of bill to forehead, 1 in. to 1 in. 1-10th; of w. to long. quill, 2 in. 2 or 3-10ths.

♀ *Above*, "light greenish brown, quills darker, t. black.—*Below*, pale yellow; (differs from ♀ of *N. mahrattensis* only in darker tint of plumage above)." *Jerd.*

Hab. Ceylon, *Linn.* Carnatic, on the west coast of the peninsula, *Jerd.* Continental India.—*Note.* Varies in the intensity of the blue or purple shade of the plumage, and in the breadth of the reddish pectoral bar.

N. MAHRATTENSIS, Latham, 1801.

Certhia mahrattensis, Lath. Ind. Orn. Supp. p. xxxvi. 1801; Jerd. Mad. Journ. 1840, p. 127.—*Le Souimanga du pays des Mahrattes*, Vieill. Enc. Method. Orn. p. 595—*Souimanga azuré*, *C. cyaneus*, Enc. Method. p. 599 ?—*Le Souimanga violet*, Vieill. Ois. Dor. pl. xii.—*Purple Indian Creeper*, Edw. Glean. ii. pl. 265, und. figure.—*C. orientalis*, Franck. Proceed. Zool. Journ. 1831, p. 122. *Eastern Creeper*, Lath. Gen. Hist. iv. p. 232, and *Sugar Creeper*, *C. asiatica*, p. 238, seem also synonims (syn. exc.).

♂ *Above*, steel-blue, varied with green and purple reflections; w. brownish black; t. black, feathers edged with steel-blue.—*Below*, chin, neck, and upper breast, steel-blue, inclining to green and violet; fore part of the neck of a deeper and more violet tint, showing a central mark running downwards for the whole length of the gular patch; across the lower breast a very narrow band of purplish red (sometimes partial, sometimes entirely wanting); belly, vent, and und. t.-covers, black, latter tipped with steel-blue; axillary tufts king's-yellow, overlaid with orange-red; bill, tarsi, and feet, black.—Length, 4 in. 1-10th to 4 in. 5-10ths; of bill to forehead, 7-10ths; of w. to long. quill, 2 in. 1-10th to 2 in. 2-10ths.

♀ "*Above*, greenish brown-grey, quills dusky, tail black.—*Below*, pale yellow, darkest on the throat." *Jerd.*

Hab. Continental India and the Peninsula. Summit of the Nylgherries, *Jerd.* Nipaul, *Hodg.* S. Africa, *Col. Sykes* (requiring confirmation).—*Note.* If correct in *N. asiatica* for a syn., the bird should bear that name, being given in the Ind. Orn. in 1790. Varies in the shade of steel-blue and purple, and in the distinctness and colour of the reddish pectoral band. Differs from *N. lotenia* in proportion of bill, black belly and vent, reddish orange on axillary tufts.

N. MINIMA, Sykes, 1832.

Cinnyris minuta, Sykes, Proc. Zool. Soc. April, 1832, p. 93; Jerd. Mad. Journ, 1840, p. 128.

♂ *Above*, crown and nape metallic-olive with purple reflections (texture soft); sides of the neck, back, rump, and up. t.-covers purplish scarlet-red, on the lower back and t.-covers, varied with pale bluish purple; w. umber-brown, t. blackish brown.—*Below*, neck, throat, and up. breast amethystine-purple; belly, vent, and und. t.-covers deep primrose-yellow; bill, tarsi, and feet, wood-brown.—Length, 3 in. 6-10ths; of w. to long. quill, 1 in. 8-10ths.

♀ *Above*, head, cheeks, back of the neck, and up. back, yellowish oil-green; less. w.-covers, lower back, and up. t.-covers, purplish scarlet-red, with a slight tinge of bluish purple; w.

and t. umber-brown.—*Below*, primrose-yellow, darkest on the throat and breast.

Hab. High forest jungle of Malabar, *Jerd.* Dense woods of the Ghauts of the Deccan. *Col. Sykes.*

N. SOLARIS, Temminck, 18—.

Souimanga souci, N. solaris, Temm. Pl. Col. 347, fig. 3.

♂ *Above*, coronal patch green, reaching rather beyond the line of the eyes; back of the neck, back, rump and up. t.-covers, dark oil-green; w. and t. umber-brown.—*Below*, throat, fore part of the neck and up. breast, very deep indigo tinted with violet, shading to dark metallic-green upon the edges of the gular patch; lower breast, belly, vent, and und. t.-covers, brilliant orpiment orange, paler on the vent.—Length 4½ in.

Hab. Amboyna. Temm.

N. PECTORALIS, Horsfield, 1821 *

Nect. pectoralis, Horsf. Trans. Linn. Soc. xiii. 1st. p. 167, 1821.—*Souimanga distingue, N. eximia*, Temm. Pl. Col. 138, M. & F. 18—.—*Certhia Philippensis olivacea*, Briss. Ornithol. 4to. iii. p. 623, pl. xxxiv. fig. 4; 8vo. ii. p. 7?—*Grimpereau olive des Philippines*, Pl. Enl. 576, fig. 4?

♂ *Above*, front in a line with the eyes, a narrow streak over each steel-blue; w. umber-brown, feathers edged with oil-green; tail black, feathers (except the centre pair) tipped with white, that on the outside for half its length; other upper parts dark yellowish oil-green.—*Below*, chin, throat, and breast, deep steel-blue, in the centre of the throat and neck tinted with purple, and showing a defined mark; belly, vent, and und. t.-covers king's yellow, axillary tufts of a deeper shade; bill, tarsi, and feet, blackish brown.—Length, 3 in. 9-10ths; of bill to forehead, 7-10ths; of w. to long. quill, 2 in. 1-10th.

Hab. Java, *Horsf., Reinwardt.*

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* Pub. 1821; paper read, 1820.

N. JUGULARIS, Linnæus, 1766.

Certhia jugularis, Linn. Syst. Nat. p. 185.—*Certhia Philippensis minor*, Briss. Ornithol. 4to. iii. p. 617, pl. xxxii. fig. 5.; 8vo. ii. p. 5?—*Souimanga a gorge blue*, Vieill. Ois. Dor. p. 51, pl. xxix.

♂ *Above*, yellowish hair-brown, greenish predominating on the lower part of the back; w. umber-brown; t. black, feathers (except the centre pair) tipped with white, that on the outside for half its length.—*Below*, chin, throat, and up. breast, deep steel-blue, intensely dark in the centre, at the sides a few dark brown feathers indicating a brown terminal band: belly, vent, and und. t.-covers dull king's yellow, paler towards the vent; axillary tufts ample, deep king's-yellow; bill, tarsi, and feet, black.—Length, 3 in. 9-10ths; of bill to forehead, 7-10ths; of w. to long. quill, 2 in. to 2 in. 2-10ths.

Hab. Philippine Islands, *Linn.*, *Briss.* *Cumming* (sp. in Zool. Soc.).—*Note.* The figure of Brisson is represented with the throat only dark.

N. GOALPARIENSIS, Royle, 18—.

Certhia Goalpariensis, Royle, Illust. Introd. p. lxxviii. tab. vii. fig. 1, 18—.—*Goulparah Creeper*, Lath. Gen. Hist. iv. p. 221, pl. lxxiv.——*Cinnyris Vigorsii*, Sykes, Proceed. Zool. Soc. 1832, p. 99.

♂ *Above*, crown golden green with purple reflections; nape, back, and scapulars, deep brownish carmine-red, rump banded with pale king's yellow, which can be concealed by lateral lengthened feathers of oil-green; w. umber-brown, feathers edged with oil-green; up. t.-covers and two centre t.-feathers deep green, remaining t. brownish black.—*Below*, chin, throat, neck, and breast, dazzling scarlet-red, on the maxilla a streak of violet-purple; belly, vent, and und. t.-covers, pale clove-brown; bill, tarsi, and feet, wood-brown, very pale on the mandible.—Length, 5 in. 4-10ths; of bill to forehead, 7-10ths; of w. to long. quill, 2 in. 2-10ths; long. feathers exceed the t. by 8-10ths.

Hab. Continental India, *Col. Sykes.* Goulparah, *Lath.* Northern India, *Royle.* Nipaul, *Hodg.*

N. LATHAMI, Jardine, 1842.

N. Lathami, Jard. Nat. Lib. vol. xxxvi. p. 233, 1842.

♂ *Above*, forehead to the line of the eyes, steel-blue; back and sides of the neck, cheeks, back, and less. w.-covers, brownish red; lower back and rump dark gamboge-yellow, protected on the sides by lengthened plumes of oil-green; up. t.-covers steel-blue; tail black, feathers edged with steel-blue, graduated; w. umber-brown, edges of the feathers paler.—*Below*, chin, fore part of the neck, and breast, scarlet-red; maxillary stripes reach to the sides of the neck; narrow feathers of two colours, black and violet, forming a line of each, the black interior; belly, vent, and und. t.-covers, dull greyish oil-green; bill, tarsi, and feet, umber-brown, mandible slightly paler.—Length, 4 in. 2-10ths; of bill to forehead, 5½-10ths; of w. to long. quill, 2 in.

Hab. Continental India.—*Note.* Differs from *N. Goalpariensis* in the general tint of colouring, blue front and up. t.-covers; t. regularly graduating?

N. EXIMIA, Horsfield, 18—.

N. eximia, Horsf. Trans. Linn. Soc. vol. xiii. p. 181.—*Souimanga de Kuhl, N. Kuhlii*, Temm. Pl. Col. 376, figs. 1, 2.

♂ *Above*, coronal patch extending to the occiput, olive with metallic lustre; back and sides of the neck, back, and w.-covers, yellowish oil-green; rump pale gamboge-yellow; w. and t. pale umber-brown, latter graduated.—*Below.* Throat, fore part of the neck, and up. breast, brownsih carmine, divided in the centre by an angular stripe of violet; belly dark umber-brown, shading to greenish white on the vent and und. t.-covers; axillary tufts very ample, white.—Length, 5 in.; of bill to forehead, 8-10ths; of w. to long. quill, 2 in. 2-10ths.

Hab. Java, *Horsf.*, *Temm.*

N. NIPALENSIS, Hodgson, 18—.

Cinnyris Nipalensis, Hodg. Spec. in Coll. of Zool. Soc.

♂ *Above*, head, cheeks, and nape steel-blue; up. part of the back with a broad crescented band of deep reddish chestnut, extending to the breast and pointing upwards on the sides of the neck; lower back, less. w.-covers, scapulars, edges of the quills, and secondaries, clear oil-green; rump gamboge yellow; up. t.-covers steel-blue; w. blackish-brown; t. graduated, feathers rather accuminated at the tips, black—the two outer pairs tipped with grey, the outer feathers greenish steel-blue, black at the base and tips.—*Below*, gamboge-yellow, centre of the breast and belly reddish orange, throat steel-blue, inside of the w. pale yellowish white; bill, tarsi, and feet, blackish-brown.—Length, 5½. in.; of bill to forehead, 7-10ths; of w. to long quill, 2 in.

Hab. Nipaul, *Hodg.*

N. GOULDIÆ, Vigors, 1831. *

Cinnyris gouldiæ, Vig. Proc. Zool. Soc. part i. 1830 and 1831, p. 44; Gould. Cent. of Birds from Himalaya Mount. pl. lvi.

♂ *Above*, crown extending to the occiput in a point, auriculars, spot at insertion of w., up. t.-covers, metallic blue with purple reflections; back and sides of the neck, back, chestnut red with a mixture of carmine; rump gamboge-yellow. w. umber brown; t. black, centre feathers elongated, broadly edged with steel-blue. — *Below*, gamboge-yellow sparingly dashed with red; throat steel-blue with purple reflections; bill, tarsi, and feet, umber-brown.—Length (equaling *N. goalpariensis*).

Hab. Alpine India. Himalaya, *Gould.*

N. HODGSONI, Jardine, 1842.

♂ *Above*, crown, nape, up. t.-covers, very deep blue; sides of the neck, up. back, and scapulars, dark reddish chestnut (nearly blood-red); lower back black; neck pale yellow; w. brownish black; t. black, centre feathers much lengthened,

* February.

edged broadly with blue at the centre.—*Below*, chin, fore part of the neck, and breast, deep black; maxillary stripes long, deep blue; vent and und. t.-covers greenish grey; flanks and under surface of the w. yellowish white; bill brownish black; tarsi and feet umber-brown.—Length, 5½ in. ; of bill to forehead, 7-10ths; of w. to long quill, 2-10ths; centre t. feathers exceed true tail 1 in. 2-10ths.

Hab. Nipaul, *Hodg.*—*Note.* Our specimen rather mutilated; descript. will require revision with a perfect skin.

N. PHÆNICURA, Jardine, 1842.

————————, Col. Zool. Soc. No. 1690 (not named).

♂ *Above*, crown steel-blue; back and sides of the neck, back, up. t.-covers, two long t. feathers, and the outer webs of the others, bright orange scarlet-red; rump dull gamboge yellow; scapulars, less. w.-covers, and edges of the quill and secondaries, oil-green; wings umber-brown; tail, inner webs of the feathers, except the centre pair, umber-brown, tips paler,—seen from beneath, reddish grey.—*Below*, chin and centre of the throat and neck, deep velvet black, bordered by maxillary stripe of deep steel-blue; breast and upper belly orange-yellow; lower belly, vent. and und. t.-covers, dull gamboge-yellow; bill blackish-brown; tarsi and feet umber-brown.—Length, exclusive of out. t.-feathers, 5 in.; of wing to long quill, 2 in. 2-10ths.

♀ *Above*, yellowish oil-green; wings umber-brown; rump dull gamboge-yellow; up. t.-covers, centre feathers, and out. webs of others, orange scarlet-red; throat, fore part of the neck and breast, pale oil-green; belly, vent, and und. t. covers, dull gamboge-yellow, darkest in the centre of the former; bill, tarsi, and feet, brownish-black.—Length, 7 in.; long feathers exceed the others by 1½ in.

Hab. Silhet, *Sir F. Egerton, Bart.* Nipaul, *Hodg.*—*Note.* The last bird, described as ♀, was sent to Zool. Soc. by Mr. Hodgson, and is probably a young ♂. It is probable these two last species have been previously named by Mr. Hodgson.

SPECIES NOT EXAMINED, BUT WHICH APPEAR TO STAND ON GOOD AUTHORITY.*

N. PUSILLA, Vieillot, 1823.

Le Sucrier, Le Vaill. Ois. d'Af. vi. p. 172, pl. 298, M. & F.—*Le Souimanga Sucrier, Cinnyris pusillus*, Vieill. Enc. Method. p. 587.

♂ The back, back of the neck, up. w.-covers, scapulars, and the last w.-feathers near the back, deep reddish purple (maroon). The rump and up. t.-covers bright violet. Head and fore part of the neck changing green, with blue and purple reflections; all the lower parts of the body, including the lower t.-covers, reddish orange, dullest on the higher parts; quills black with blue reflections.—Size of the common wren.

♀ Yellowish olive upon the head, back of the neck, upper parts of the body, and w.; the throat and fore part of the neck very pale yellow, becoming deeper on the breast and flanks, and again changing to a paler tint on the vent.

Hab. Forests in the vicinity of Vanstaade and Loury, *Le Vaill.*—*Note.* Known by the fig. and descript. of Le Vaillant. Authority for above characters: *pusilla* is kept, that name of Linn. being applied to a female or young of some species. Should stand near *N. collaris* or *venusta*.

N. RECTIROSTRIS, Shaw, 1811.

Le Souimanga a bec droit, Vieill. Ois. Dor. pl. lxxv. p. 112. —*Le Souimanga mignon, Cinnyris elegans*, Vieill. Enc.

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* Sir W. Jardine will be obliged for the use of any of the species mentioned in this division, or of any that appear to have been omitted, so that a complete and extended Synopsis may be made out; particularly birds from Madagascar, Ceylon, Borneo, Philippine Islands. The skins transmit safely by Post, and will be carefully returned so soon as they have been examined.

Method. p. 393, 1823; Vieill. Gal. des Ois. i. p. 292, pl. clxxviii.

♂ Head, back, rump, and w.-covers, bronzed green; w. and t. clear brown, feathers bordered with dull green.—*Below*, the chin and fore part of the neck yellow, up. part of breast bronzed green, forming a broad pectoral band; lower breast, pale red; belly and vent dull yellow, becoming paler on the und. t.-covers; bill and feet, blackish.—Length, 3½ in.

Hab. Africa or India? *Vieill.*—*Note.* Descript. aut. Vieill. fig. in Ois. Dor. and Gal.

N. ASPASIA, Lesson, 1826.

Souimanga aspasia, *Cinnyris aspasia*, Less. Voy. de la Coq. vol. i. p. 676 and Atlas, pl. xxx. fig. 4.

♂ With a coronal patch of emerald-green extending over the crown upon the occiput; cheeks, sides of the neck, back, w., and t., deep velvet black, feathers of the latter edged with green; covers of the w. and their bend, lower back, and up. t.-covers, golden-green; chin, throat, and fore part of the breast, with a brilliant patch of violet inclining to steel-blue; lower part of the breast, belly, and vent, deep black.—Length, 3 in. 6 lines.

Hab. Woods around harbour of Doréry, New Guinea, *Auct. Voy. de la Coq.*—*Note.* Will stand before or after *N. calcostetha*.

N. ZENOBIA, Lesson. 1826.

Souimanga zenobie, *Cinnyris zenobia*, Less. Voy. de la Coq. vol. i. p. 679, and Atlas, pl. xxx. fig. 3.

♂ Head, back, rump, gr. w.-covers, uniform yellowish-olive; w. brown, feathers edged with yellow; t. dull brown; chin, throat, and breast, steel-blue; belly velvet-black; vent and flanks olive; axillary tufts ample, orange-yellow.

Hab. Mountains of Soya, island of Amboyna.—*Note.* Known by the plate in Voy. de la Coq.; allied to the form of *N. pectoralis*, Horsf.

N. ? EQUES, Lesson, 1826.

Souimanga décoré, Cinnyris eques, Less. Voy. de la Coq. i. p. 678, and Atlas, pl. xxxi. fig. 1.

♂ Plumage uniform yellowish umber-brown; fore part of the neck, throat, and breast, with a gular patch of bright scarlet-red; bill and feet black.—Length 4 in. 5 lines.

Hab. Island of Waigiou, harbour of Doréry, N. Guinea. *Lesson.—Note.* Known by the plate in Voy. de la Coq.

N. SIPARAJA, Raffles, 1822.

Certhia siparaja, Raff. Trans. Linn. Soc. xiii. p. 299.—*Cinnyris siparaja*, Cat. Zool. Spec. Mem. Sir St. Raff. App. p. 673.—*Souimanga moustac, N. mysticalis*, Temm. Pl. Col. 126, fig. 3.—(Auct. Cat. Mem. Sir St. Raffles, *sup. cit.*)

♂ Crown, with an imbricated patch of violet passing the line of the eyes, a maxillary streak, rump, and t. of the same colour; back of the neck, back, and less. w.-covers, brilliant purplish red; w. blackish grey; throat, neck, and breast, purplish red (clearer than above); belly, vent, and und. t.-covers, white; bill and feet reddish brown.—Length, 4 in.

Hab. Java, *Temm.—Note.* This species has the t.-feathers elongated and ought to follow *N. goalpariensis* and *lathami*.

N. CARDINALINUS, Vieillot, 1823.

Cinnyris cardinalinus, Le Souimanga cardinalin, Vieill. Enc. Method. p. 598.—*Le Sucrier cardinalin*, Le Vaill. vi. p. 149, pl. 291.

♂ Head, neck, back, rump, all the up. w.-covers, up. t.-covers, and the two long t.-feathers, golden-green; from the breast, carmine-red.

♀ With the under parts yellow, instead of carmine-red.

Hab. Mountains in the country of the Great Namaquois, *Le Vaill.—Note.* This is of the same form with *N. pulchellus*, and should stand after it. Vieillot suspects that it is that bird in mature plumage? Known by the descript. and figure of Le Vaillant.

N. ÆNEUS, Vieillot, 1823.

Le Souimanga bronze, Cinnyris ænæus, Vieill. Enc. Method. p. 599.—*Le Sucrier bronze*, Le Vaill. vi. p. 170, pl. 297.

♂ Head, neck, back, up. w.-covers, rump, and up. t.-covers, dark metallic-blue, with bronzed green and purple reflections; w. and t. bronzed black; from the breast, black with a slight tint of olive; axillary tufts yellow; bill much curved.

♀ Olive-green where the metallic-blue of the ♂ occurs; from the breast, olive brownish-black; bill less curved.

Hab. Vicinity of the river Sondag, *Le Vaill.*—*Note.* Of the form of *N. lotenia* and *mahrattensis*, after which it may stand. Known by the fig. and descript. of Le Vaillant. Is this the species under the name of *N. polita*, considered by Col. Sykes as common to Africa and India?

N. INSIGNIS, Jardine, 1842.

N. pectoralis, Souimanga pectorale, Temm. Pl. Col. pl. 138, fig. 3.

♂ Crown and nape emerald-green; cheeks, back of the neck, and back, velvet-black; w.-covers and up. t.-covers, green with purple reflections; w. dull black, t. black, edges of the feathers green, graduated; chin, throat, fore part of the neck and breast, carmine red, maxillary stripes lengthened and surround the corner patch, blue; belly black, tinted with blue; vent, flanks, and und. t.-covers, dull black; axillary tufts king's yellow; bill and feet black.—Length 4 in. 6 lines.

Hab. Java, *Temm.*—*Note.* Known by the figure quoted above. The name *pectoralis* is previously applied by Horsfield. See that sp. in Synopsis.

N. RUBESCENS, Vieillot, 1823.

Le Souimanga mordoré, C. rubescens, Vieill. Enc. Method. Ois. p. 593.

♂ Forehead golden-green, changing to blue on the crown; body above golden-red *(aurato rubro)*; w. and t. black.—Throat and fore part of the neck green, bordered with blue

on the lower part; breast, belly, and und. t.-covers velvet-black.

Hab. Congo, *Vieill.*—*Note.* Known by Vieillot's descript. *sup. cit.* We consider the up. parts will be meant, as dark brownish black with a yellowish red reflection. It will stand near to *N. stangeri*, &c.

N. SUPERBUS, Vieillot, 1823.

Le souginbindou, Vieill. Ois. Dor. pl. xxii.—*Le Soui-manga souginbindou, C. superbus*, Vieill. Enc. Method. Orn. p. 597.

♂ Coronal patch blue; occiput, back of the neck, back, and up. w. and t.-covers, golden-green; w. and t. black.—Throat violet-purple with green reflections; breast red, separated from the throat by a narrow band of golden-green; belly, flanks, and und. t-covers, dull red.

Hab. Congo, Malemba, *Vieill.*—*Note.* Known by the figure in Ois. Dor. Will stand near *N. splendida* and *bifasciata*.

N. ABYSSINICA, Hemprich and Ehrenberg, 18—.

N. Habessinica, Hemp. and Ehrenb. Symb. Phys. av. pl. iv.

♂ Crown, neck, and back, dark green with a bright golden lustre, forehead and crown having a violet lustre.—Breast with a blue interrupted band; above, crimson, terminated with yellowish spots; belly and vent violet-black, without lustre.—Length, 4 in. 9-10ths; of bill, 8¼ in.

♀ Greyish brown; tail, above, blackish.—Paler, vent and out. t.-feathers margined with white; belly with a yellow central spot.

Hab. Coasts of Abyssinia at Gelet, *Hemp.* and *Ehrenb.*—*Note.* Differs from *N. chalybea* in belly black, crown with a violet lustre, no blue rump; from *N. chloropygia* in violet crown. Known by the plate and descript. in the *Symbolæ Physicæ*, the authority for above.

N. AFFINIS, Rüppell, 18—.

Cinnyris affinis, Rüpp. N. Wirb. p. 87, taf. 31, fig. 1.

♂ Forehead black, tinted with bluish-purple; crown, back of the neck, and back, golden green; rump ultramarine-blue; tail black.—Chin and a pectoral band black; throat and fore part of the neck golden-green; belly and vent, yellow; axillary tufts orange.

Hab. Valleys on the coast of Abyssinia, near Massua, *Rüpp.* —*Note.* Differs from *N. metallica* in greater length of bill, black pectoral band. The name *affinis* will probably remain, as the same appellation given to a species in a previous part of the Synopsis may become a synonim to *N. sperata.*

N. MADAGASCARIENSIS, Vieillot, 1823.

Le Grimpereau violet de Madagascar, Briss. Ornithol. 4to. iii. pl. xxxii. figs. 2, 3, p. 638.—*Le Souimanga*, Vieill. Ois. Dor. ii. pl. xviii.—*Le Souimanga proprement dit, C. Madagascariensis*, Vieill. Enc. Method. Orn. p. 591.

♂ Head, neck, back, scapulary feathers, and less. w.-covers, brilliant green, with a shade of violet in particular lights; the lower part of the back, rump, and up. t.-covers, brownish olive; w. brown, feathers edged with olive; t. black, bordered with green. Throat and neck, brilliant green; breast brown, separated from the colour of the neck by two transverse bands, the upper violet-blue, the lower purplish brown; the belly and lower t.-covers pale yellow; flanks olive; axillary tufts yellow. —Length, 4 in. 1 line.

♀ Olive-brown; w. and t. as in ♂.—Olive yellow.

Hab. Madagascar, *Briss.*—*Note.* First known by descript. of Brisson. Figured in Ois. Dor. The former our present authority.

N. ANGLADIANUS, Shaw, 1811.

Le grimpereau verd de Madagascar, Briss. Ornithol. 4to. iii. pl. xxxiii. figs. 4, 5, p. 641.—*L'Angla-dian.* Vieill. Ois. Dor. pls. iii., iv.—*Souimanga Angla-dian. C. lotenia*, Vieill. Enc. Method. Orn. p. 590.

♂ Golden-green; w. and t. black, feathers bordered with green; throat and neck golden-green; breast, belly, flanks, and

und. t.-covers, velvet-black, these colours separated on the breast by a narrow transverse band of brilliant violet.—Length 5 in. 3 lines.

♀ Green; w. and t. blackish-brown; breast, belly, sides, and und. t.-covers, greyish-white, varied with black spots.

Hab. Madagascar *Briss.*—*Note.* Standing near to *N. splendida, bifasciata*, &c. Known by descript. of Brisson and figure in Ois. Dor. The former our present authority.—N. *lotenia*, Linn. is frequently quoted erroneously as a syn. for this bird and N. *splendida*.

THE END.

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